

MONTHLY WEATHER REVIEW.

VOL. XII.

WASHINGTON CITY, FEBRUARY, 1884.

No. 2.

INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States during February, 1884, based upon the reports from the regular and voluntary observers of the Signal Service, and from co-operating state weather services. Descriptions of the storms which occurred over the north Atlantic ocean during the month are also given, and their approximate paths shown on chart ii.

The most important features of the month were the destructive flood in the Ohio river and the violent tornadoes of the 19th in the Southern states.

The flood in the Ohio river reached a height greater than was ever before known, causing the inundation of the cities and towns along its banks. Very great destruction of property resulted and many thousands of the population were rendered destitute. At Cincinnati, Ohio, the water rose to a height exceeding the great floods of former years, as follows: February, 1832, six feet and ten inches; December, 1847, seven feet and six inches; February, 1883, four feet and nine inches.

On the afternoon and evening of the 19th violent and destructive tornadoes occurred in the Southern states, east of the Mississippi river, during the passage of the storm described under "areas of low barometer" as number ix., and while it was central in the upper lake region. They were most destructive in Alabama and Georgia, where great loss of life and destruction to property occurred.

The monthly precipitation exceeded the average over nearly the whole country, the excess being greatest from Tennessee northeastward to New England, and in southern California. Deficiencies occurred in the west Gulf states, southern slope, Rio Grande valley, and north Pacific coast region, the departure in the last-named district exceeding 4.00 inches.

The month was from 2° to 12° colder than the average February over the northern districts from the upper lake region and upper Mississippi valley westward to the Pacific coast, the greatest departures occurring in the extreme northwest and Missouri valley. Over the southern districts, lower lake region, Ohio valley, and on the Atlantic coast, the month was warmer than the average by from 1° to 5°, the most marked departure being shown in the south Atlantic states.

In the preparation of this REVIEW the following data, received up to March 20th, 1884, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-two Signal Service stations and fifteen Canadian stations, as telegraphed to this office; one hundred and sixty monthly journals, and one hundred and forty-six monthly means from the former, and fifteen monthly means from the latter; two hundred and seventy-seven monthly registers from voluntary

observers; forty-nine monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the local weather services of Indiana, Iowa, Kansas, Nebraska, Ohio, and Tennessee, and of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The distribution of mean atmospheric pressure for February, 1884, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart iii. From this chart it will be seen that the region of greatest atmospheric pressure for the month comprises parts of Montana, Dakota, and Minnesota, where the monthly barometric means exceeded 30.2—the maximum, 30.24, occurring at Fort Buford, Dakota, and at Forts Assinaboine and Benton, Montana. Westward from the region of greatest pressure the monthly barometric means decrease to 30.0 and below, at stations on the northern and middle Pacific coasts; to the southward, to 30.01 in Arizona; to the eastward, to from 30.01 to 30.05, over an area extending from eastern Illinois to New England; southeastward, to 30.07 in central Arkansas and western Tennessee, and thence increasing over the south Atlantic and eastern Gulf states—a small area in northern Georgia being inclosed by an isobar of 30.15. The least monthly mean pressure, 29.97, is reported from Cape Mendocino, California.

The mean pressure of February, 1884, compared with that of the preceding month, shows a slight increase over the Canadian maritime provinces. In all other districts a decrease has taken place, excepting the northern part of the upper lake region and northern New England where no change occurred. The largest deficiencies are shown over the region from the upper Mississippi and lower Ohio valleys southwestward to Texas, where they varied from .15 to .21. On the Pacific coast the deficiencies varied from .09 to .12; in the extreme northwest, lower lake region, middle and south Atlantic states, from .01 to .09.

DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

In the extreme northwest and at the more northerly stations in the upper lake region, the mean pressure of February, 1884, was above the normal, the departures ranging from .01 to .07. In all other parts of the country, except in New England where it was normal, the mean pressure was below the normal for February. The greatest deficiencies occurred on the Pacific coast from southern California to southern Oregon, and from central Ohio valley and Tennessee to the Atlantic coast. In those districts the departures varied from .10 to .13. In southern New England, the lower lake region, Indiana, Illinois, Missouri, and from the south Atlantic coast westward to New Mexico, the departures below the normal varied from .04 to .10; in the remaining districts the deficiencies were less marked.

BAROMETRIC RANGES.

The monthly barometric ranges were greatest in New England, where, at Eastport, Maine, and Provincetown, Massachusetts, they exceeded 2.00. They were least in Florida and the southern plateau. North of a line extending from the Pacific coast near San Francisco, eastward to northern Illinois, and thence southeastward to the South Carolina coast, the monthly ranges exceeded 1.00. South of this line they varied from .70 to 1.00, except in Florida and the southern plateau, where they were less.

In the several districts the monthly barometric ranges varied as follows:

New England.—From 1.53 on the summit of Mount Washington, New Hampshire, to 2.04 at Eastport, Maine, and Provincetown, Massachusetts.

Middle Atlantic states.—From 1.23 at Lynchburg, Virginia, to 1.57 at Sandy Hook and Barnegat City, New Jersey.

South Atlantic states.—From .66 at Jacksonville, Florida, to 1.14 at Fort Macon, North Carolina.

Florida peninsula.—From .34 at Key West to .58 at Sanford.

East Gulf states.—From .64 at Pensacola, Florida, to .80 at Vicksburg, Mississippi.

West Gulf states.—From .70 at Galveston, Texas, to .96 at Little Rock, Arkansas.

Rio Grande valley.—From .70 at Brownsville, Texas, to .77 at Rio Grande City, Texas.

Tennessee.—From .82 at Chattanooga to 1.05 at Nashville.

Ohio valley.—From 1.11 at Louisville, Kentucky, to 1.17 at Indianapolis, Indiana.

Lower lake region.—From 1.21 at Rochester, New York, to 1.32 at Erie, Pennsylvania.

Upper lake region.—From 1.06 at Chicago, Illinois, and Milwaukee, Wisconsin, to 1.40 at Port Huron, Michigan.

Extreme northwest.—From 1.38 at Bismarck, Dakota, to 1.54 at Saint Vincent, Minnesota.

Upper Mississippi valley.—From .97 at Keokuk, Iowa, and Springfield, Illinois, to 1.15 at Saint Paul, Minnesota.

Missouri valley.—From 1.07 at Leavenworth, Kansas, to 1.41 at Fort Bennett, Dakota.

Northern slope.—From .87 at Cheyenne, Wyoming, to 1.20 at Fort Shaw, Montana.

Middle slope.—From .81 on the summit of Pike's Peak, Colorado, to .99 at Denver and West Las Animas, Colorado, and Dodge City, Kansas.

Southern slope.—From .52 at Fort Davis, Texas, to .78 at Fort Concho, Texas.

Southern plateau.—From .53 at Fort Grant, Arizona, to .69 at Fort Thomas, Arizona.

Middle plateau.—1.10 at Salt Lake City, Utah.

Northern plateau.—From 1.20 at Boise City, Idaho, to 1.48 at Lewiston, Idaho.

North Pacific coast region.—From 1.16 at Roseburg, Oregon, to 1.28 at Olympia, Washington Territory.

Middle Pacific coast region.—From .98 at San Francisco, California, to 1.04 at Red Bluff, California.

South Pacific coast region.—From .70 at Los Angeles, California, to .76 at Yuma, Arizona.

AREAS OF HIGH BAROMETER.

The areas of high barometer, traced during the month, were generally observed first north of the boundary line separating the Northwest Territory and the United States, although three of the seven observed approached the stations from the Pacific, where the barometer continued high after the high area had passed to the east of the Rocky mountains. The general course of the movement was easterly, and the most extended of these areas passed to the Atlantic over unusually high latitudes, reaching the coast north of New England.

Number i., approached from the north of Dakota and Montana and was first observed on the night of the 1st. The pressure increased at the stations near the northern boundary of the United States, from Lake Huron westward to Idaho

and reached the maximum of 30.7 in Montana, on the morning of the 3d, when the temperature ranged from -10° to -25° in this region. This area extended eastward over the Saint Lawrence valley during the 3d and 4th, causing the temperature to fall to -25° at Rockliffe, Ontario, and to -20° at Father Point, Quebec, at 7 a. m. of the 4th. The course of this area was directly to the east, north of the United States from the point where it was first observed, north of Montana, until it disappeared to the east of the maritime provinces on the 5th.

II.—When the preceding area was passing to the east of the coast line this area appeared north of Montana. The pressure did not equal that attending the first high area until the centre had passed to the northeast of the lake region, but the temperature was lower at extreme northern stations in the northwest while it was not as low in the Saint Lawrence valley, where the pressure exceeded that observed during the transit of number i. As in the case of number i., the course was easterly north of the stations of observation, remaining near the northern limit of the stations about four days, and moving slowly when near the interior of the continent and rapidly as it approached the coast.

III.—This area was also first observed north of Montana, the pressure increasing in the extreme northwest on the 8th, while the barometer was above 30.8 over the maritime provinces. During the 9th, 10th, and 11th the barometer was unusually high in the northern districts of the United States, and on the night of the 10th and morning of the 11th it reached its maximum of 31.0 at stations in the Saskatchewan valley. This was the most marked high area observed during the month, extending from the Atlantic to the Pacific coast, the pressure ranging from .20 to .60 above the normal in all northern districts. The morning report of the 12th indicated a rapid fall in the barometer in the central valleys, although it remained above 30.6 in Manitoba, where the temperature was -27° . The succeeding report showed a rapid decline of pressure in the advance southward of a cold wave which extended over the southern and eastern districts during the 13th and 14th, causing sudden and marked changes in temperature without unusual changes in pressure. On the 13th and 14th a part of this area moved southward to Texas, where the barometer rose to 30.42 on the 14th, attended by a severe "norther" on the west Gulf coast. After the morning of the 14th the course of this secondary high area changed and it moved to the northeast, passing over the Ohio valley, lower lake region, and New England, causing clear, cold weather until it disappeared off the New England coast on the 17th.

IV.—This area appeared north of Montana on the 16th, but apparently moved to the northeast without causing any marked change in the meteorological conditions within the limits of the United States.

V.—During the night of the 18th the barometer rose in the Rocky mountain regions, while an extended barometric trough covered the Mississippi valley. The centre of greatest pressure moved rapidly southward and was in Texas at midnight of the 19th. The cold wave attending this high area extended over all districts east of the Rocky mountains, and very destructive tornadoes occurred in the Southern states when the cold northerly winds met the warm southerly winds from the Gulf of Mexico. After reaching the southern point of its course in Texas this area moved eastward over the Southern states and disappeared with a slight decrease of pressure as it approached the coast.

VI.—The telegraphic reports indicate that this area originated west of the Pacific coast, and that it passed eastward to the Rocky mountain regions on the 21st. The barometer remained about .2 above the normal on the Pacific coast and westward of the Missouri valley, while it increased in the west Gulf states on the 22d. This area disappeared as it approached the Gulf of Mexico, and before it reached the Atlantic coast.

VII.—As in the preceding case this area approached the stations of observation from the Pacific coast. On the 25th

the barometer was above 30.5 on the north Pacific coast, and on the 26th it was 30.71 in northern Montana. The centre of greatest pressure remained north of the United States until midnight of the 27th, but the cold wave and high-pressure attending this area were traced as far south as the Gulf coast. By midnight of the 28th this area had become well-defined in the Missouri valley, but the pressure had declined to 30.47 at the centre. It continued to move southward until the 29th, when it extended over Texas, attended by freezing weather. This area also decreased in energy as it approached the Gulf coast, where it disappeared on the 29th.

AREAS OF LOW BAROMETER.

Fifteen atmospheric depressions have been traced over or near the limits of the United States during the month of February. These depressions generally reached the Atlantic coast in high latitudes, the region of greatest storm-frequency being north of Lake Ontario, over which ten of the depressions passed. The movement of these areas was rapid and the average course to the northeast, north of the mean storm tracks of the month after the depression had moved east of the Mississippi river. All depressions traced west of the Mississippi river inclined to the southeast while passing over the eastern slope of the Rocky mountains. Two depressions disappeared while within the limits of the stations after having been well defined by inclosing isobars.

The following table gives the latitude and longitude in which the several depressions were first and last observed, and the average hourly velocity of each depression:

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.	37 00	87 00	48 00	59 00	55.0
II.	53 00	107 00	50 00	67 00	47.0
III.	33 00	93 00	49 00	62 00	30.0
IV.	37 30	120 00	40 00	114 00	25.0
V.	37 00	91 00	44 00	61 00	81.0
VI.	34 00	93 00	47 30	70 00	59.0
VII.	43 00	31 00	50 00	68 00	59.0
VIII.	40 00	102 00	41 00	68 00	47.0
IX.	47 00	107 00	49 00	67 00	39.0
X.	46 00	110 00	46 00	72 00	52.0
XI.	52 00	104 00	47 00	61 00	47.0
XII.	40 00	96 00	40 00	85 00	24.0
XIII.	51 00	99 00	46 00	59 00	42.0
XIV.	29 00	97 00	48 00	61 00	50.0
XV.	50 00	100 00	40 00	94 00	53.0
Mean hourly velocity.....					47.4

I.—This disturbance was central in the Mississippi valley on the 31st of January. At 7 a. m. of February 1st it had reached the Atlantic coast, the barometer being lowest near Portland, Maine, where it had fallen to 29.46. The winds increased in force after shifting to the northwest, the maximum velocities at coast stations north of Hatteras, North Carolina, ranging from thirty to fifty miles per hour, the strong winds occurring on the middle Atlantic coast. This storm passed rapidly over Nova Scotia during the night of the 1st, and disappeared to the north of Sidney, where the barometer rose from 29.42 to 29.80 in the eight hours ending at 7 a. m. of the 2d.

II.—This low area possibly passed from the north Pacific, as it was observed in the upper Saskatchewan valley at midnight of January 31st. The first movement was slightly to the south of east. It passed to the north of the stations of observation, and on the morning of the 2d was central immediately north of Georgian bay. The barometer reached the minimum in the upper lake region when the centre was north of Lake Superior. After the course changed to northeast the pressure increased slowly at the centre, the storm passing over the Saint Lawrence valley with decreasing energy during the 2d.

III.—The barometer was below the normal in the west Gulf states from the morning of the 2d until midnight of the 3d, with an apparent westerly movement of this low area. An extended area of high barometer covered the northern portion of the United States, and it was not until this high area had

moved to the Saint Lawrence valley that the advance of this depression was noted. On the morning of the 4th the barometer was lowest in Indian Territory, when general rains prevailed in the northeast quadrant of this area. It moved to the northeast during the 4th, with increasing energy. After reaching the upper Mississippi valley the course changed to easterly and it passed over the lake region attended by very heavy rains in the lower lake region, and snow and rain in the upper lake region. The 3 p. m. report of the 5th exhibited two well-marked depressions of 29.5—one near Alpena, Michigan, and the other near Montreal, Quebec—both being inclosed by an isobar of 29.6 extending from northern New England to Michigan. These minor depressions united at the succeeding report and the disturbance passed to the southeast of New England, leaving an extended barometric trough in the Ohio valley and southwest.

IV.—Reports received from the Pacific coast during the 5th, indicate that this depression approached the coast of California from the west. Heavy rains prevailed in California, as far south as San Diego, on the 5th. The area was central in the interior of California on the morning of the 6th, and at the 3 p. m. report of that date, the barometer was lowest, 29.46, near Red Bluff. There was a slow easterly movement until the morning of the 7th, when the depression disappeared in eastern Nevada. Succeeding reports indicate the presence of a slight depression in western Colorado, but the atmospheric movement was slow, and the centre of depression could not be definitely located.

V.—This area developed in the lower Mississippi valley during the night of the 8th, when a cold wave was advancing from the northward over the eastern slope of the Rocky mountains, and warm east to south winds prevailed in the southern states. It was central in northern Arkansas at midnight of the 8th. The rapid advance of the cold air apparently forced this depression to the northeast with unusual velocity, as the centre of disturbance was near Lake Ontario eight hours after it appeared in Arkansas, but a barometric trough extended to the lower Ohio valley. This storm passed directly east over New England during the 9th, without causing marked changes in the atmospheric conditions.

VI.—Preceding the formation of this disturbance in the southwest on the 12th, the barometer was generally low on the Pacific coast and over the middle and southern plateau regions on the 10th and 11th, but the low area on the Pacific coast could not be traced east of the Rocky mountains, the pressure remaining above 30.0 at El Paso, while it was below 30.0 in the Rio Grande valley. The low area central over the middle plateau region at report immediately preceding the development of number vi. disappeared, the pressure increasing .23 in eight hours—from 3 p. m. to 11 p. m. of the 11th. A barometric trough was observed on the morning of the 12th, extending from southern Texas to Illinois, and snow and rain prevailed from Texas and Arkansas northward to Minnesota, the temperature being -27° in Manitoba. The storm-centre reached Lake Huron by midnight of the 12th, attended by brisk winds in the lake region and cold northerly winds as far south as the west Gulf coast. This storm followed the general course of the Saint Lawrence valley, and was last traced as central near Quebec on the afternoon of the 13th.

VII.—This low area probably formed a part of number vi., as it developed in the lower lake region while the former was central in the lower Saint Lawrence valley. The advance of the cold wave from the west increased the energy of the storm, the contrast of temperature in the southeast and southwest quadrants being very marked. At the morning report of the 14th the following observations were reported: Albany, New York, 51° ; Toledo, Ohio, 16° ; Washington City, 61° ; Louisville, Kentucky, 19° ; Cairo, Illinois, 15° ; Little Rock, Arkansas, 18° . The centre of this storm was near Montreal at 7 a. m. of the 14th, when the barometer had fallen to 29.4, the gradient being greatest to the southwest, and the pressure being 30.4 in Texas. Northwest gales occurred on the middle

Atlantic and New England coasts on the 14th, when this low area had passed to the northeast of New England.

VIII.—During the 18th the barometer was below the normal on the Pacific coast and the reports indicated the advance of a depression over the northern plateau region. These conditions immediately preceded the development of low area number viii. in Colorado on the morning of the 16th. The high area to the north of Colorado apparently forced this storm to the southeast until midnight of the 16th, when it was central in eastern Texas. During the southeasterly movement of this depression stormy weather continued on the Pacific coast, where the barometer continued decidedly below the normal. This storm was inclosed by an isobar of 29.9, including within its area the greater portion of the Mississippi valley, on the morning of the 17th. It moved slowly to the east attended by rain in all districts east of the Mississippi and snow in the northwest. The midnight report of the 17th exhibited two depressions—one on the middle Atlantic coast and one in the Ohio valley. The slight depression in the Ohio valley disappeared on the morning of the 18th, while the one on the middle Atlantic coast increased in energy and moved to the northeast, south of the coast line.

IX.—This disturbance approached from the Pacific, passing over Oregon and Washington Territory to Montana, where it was central at midnight of the 17th. It moved directly east to the upper Mississippi valley, where it was central at midnight of the 18th, forming a barometric trough which extended from Lake Superior to northern Texas. Warm east to south winds prevailed over the Southern states and Ohio valley, and cold north winds in the Missouri valley and on the eastern Rocky mountain slope. This barometric trough moved slowly eastward during the 19th, the centre of the depression passing to northern Illinois and Indiana at the morning and afternoon reports, respectively, and thence to the north near Alpena, Mich., at the midnight report. Violent gales occurred in the lake region, and the temperature fell 30° in eight hours in the central valleys, and destructive tornadoes occurred in the east Gulf and south Atlantic states on the afternoon and evening of the 19th. This was the most marked disturbance of the month. The barometer fell below 29.3 when the storm passed over the Saint Lawrence valley and New England and gales occurred on the Atlantic coast from Florida to Maine. The maximum velocities were: 60 miles, w., at Sandy Hook; 50, se., at Bird Rock; 49, w., at Provincetown; 52, sw., at Kitty Hawk.

X.—This disturbance also approached the stations from the north Pacific coast, where heavy rain occurred on the 19th sixteen hours previous to the appearance of this storm in Montana. The centre followed the general course of the Missouri valley, forming an extended trough of low pressure from the upper lake region to Indian Territory. The storm track crossed the Missouri river near Yankton, Dakota, and passed directly east to northern Illinois and thence over the lake region to the Saint Lawrence valley. This storm attained its greatest energy when central over the upper lake region, the winds at Milwaukee and Grand Haven reaching a maximum velocity of forty-two miles per hour.

XI.—The 3 p. m. report of the 21st indicated the advance of a low area from the region north of Montana, where the barometer had fallen rapidly during the day. The succeeding reports showed the advance of a low area north of Dakota and Minnesota during the 22d, the disturbance moving slightly to the south, causing high winds in the lake region. At midnight of the 22d this low area was north of Kingston and west of Quebec, the barometer being low to the southward and high in the west Gulf states. A secondary depression which has been traced as a continuation of number xi. developed on the middle Atlantic coast during the night of the 22d and this followed the coast line to the northeast. Strong gales attended the northeast movement of this secondary depression, the maximum velocities occurring after the winds shifted to the northwest. The following high velocities were reported: Sandy Hook and Cape Henry, 60 miles; Kitty Hawk, 56; Delaware Breakwater, 52; Eastport, 40; Boston, 34.

XII.—This was a slight but well-defined depression which was first observed in the lower Missouri valley on the afternoon of the 23d. It passed directly east until the afternoon of the 24th, reaching the Ohio valley, when it disappeared by a gradual rise of pressure over that region, which was probably due to the advance of a decided low area at that time central north of Dakota.

XIII.—The 3 p. m. report of the 24th showed a well-defined depression north of Minnesota, where the barometer had fallen more than .40 in eight hours, with high south to west winds in the extreme northwest and a rapid gradient to the south of the centre of disturbance. This storm moved to the southeast until it reached northern Michigan, but the pressure increased from 29.35 to 29.77 during the southeasterly movement. In passing over the lake region it lost much of its energy and after reaching the Saint Lawrence valley a secondary depression developed on the coast of Nova Scotia. This last depression increased in energy and caused violent gales off the northeast coast during the 27th and 28th.

XIV.—This storm developed in southern Texas on the 27th, immediately to the south of a cold wave which extended from the west Gulf states to British America. It was apparently forced to the eastward by the cold northerly winds, and at midnight of the 27th, three centres enclosed by isobars of 29.6 were observed in the barometric trough which extended from Lake Ontario to Florida. Warm southerly winds continued at stations on the Atlantic coast, while freezing weather with snow and sleet extended as far south as Tennessee. The 7 a. m. report of the 28th, exhibited a well-defined depression central on the middle Atlantic coast attended by severe gales. After the winds shifted to northwesterly on the North Carolina coast on this date, the wind reached a maximum velocity of sixty-four miles at Fort Macon, North Carolina, and marine reports from s. s. "D. J. Foley," in latitude N. 35° 51', longitude W. 75° 05', show that strong wnw. gales prevailed, the wind blowing with hurricane force for fifteen minutes at about 2.30 p. m. This storm increased in energy as moved north-eastward, the barometer falling to 28.6 at Yarmouth and 28.42 at Anticosti.

XV.—This low area was observed north of Dakota on the morning of the 29th. It moved almost directly south during the day, and at midnight it was well-defined and central in the lower Missouri valley, enclosed by an isobar of 29.6, almost circular in form, the barometer at the centre reading 29.56.

NORTH ATLANTIC STORMS DURING FEBRUARY, 1884.

[Pressure expressed in inches and in millimetres; wind-force by scale of 0—10.]

Chart ii. exhibits the tracks of the more important atmospheric depressions that have appeared over the north Atlantic ocean during February, 1884. The location of the various storm-centres has been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels, and from other miscellaneous data received at this office up to March 22, 1884.

The observations used are in general simultaneous, being taken each day at 7 a. m. Washington, or 12h. 8m. p. m. Greenwich, mean time.

Of the ten depressions charted six are continuations of disturbances which passed over, or near, the United States and Canada; and of those six, three have been traced eastward to the European coasts. Four depressions were first observed to the eastward of the fortieth meridian, one of these was a continuation of a storm shown on the chart for January. Fresh to strong southwesterly to northwesterly gales prevailed over the Atlantic throughout the month of February.

The following are brief descriptions of the depressions charted:

I.—This was a continuation of depression number xii. of the January chart. At the close of that month the disturbance was central to the southwestward of Ireland, and by February 1st it had reached the Channel. It then passed northeastward over England and the North sea. During its passage it caused

heavy gales in the English channel and Irish sea, and some damage on land.

II.—This was a continuation of the disturbance traced as low-area i., chart 1, of this REVIEW. During the 1st it passed over the Gulf of Saint Lawrence, and by the 2d it was apparently near N. 49°, W. 52°. It moved northeastward, and passed beyond the range of the observations on the 3d. During its passage, moderate to strong southwesterly gales prevailed between N. 45° and 52°, and W. 40° and 20°, with moderate westerly and northwesterly breezes to the westward of the centre.

III.—This was a continuation of low area iii. of chart i. On the morning of the 6th the disturbance was central over the Gulf of Saint Lawrence. It moved rapidly northeastward, causing fresh westerly gales between the Banks and the fortieth meridian, and strong southerly winds near W. 30°. By the morning of the 8th, this depression was central in about N. 55° W. 20°, at the same time a depression of considerable energy appears to have developed near N. 50°, W. 38°. On the 9th the disturbance was shown as a violent storm off the northwest coast of Ireland, closely followed, but at a lower latitude, by depression number iv. above referred to. Captain J. E. Dutton, commanding the s. s. "Sardinian," reported: "9th, 2 a. m., Greenwich mean time, wind ssw. fresh gale, barometer 29.01 (735.8), weather overcast. At noon (about N. 55° 13', W. 11° 59') wind shifted to w. moderate gale, sky clearing, barometer 28.86 (733.0); at 2 p. m., wind backed to sw. force 7, with heavy squalls and very heavy confused sea from ssw to w.; at 6 p. m. wind backed to ssw. force 7, barometer 28.73 (729.7); 7 p. m. wind sse. force 7, barometer 28.69 (728.7), sea becoming more confused. At 8.30 p. m., the wind fell light and veered to wsw. with very heavy westerly sea, barometer 28.55 (725.2); from this time until 11 p. m., the wind gradually freshened and blew a hurricane for about four hours during which time the barometer remained steady at 28.55 (725.2). High seas caused some damage to boats and deck fittings." Captain G. Moodie, commanding the s. s. "State of Georgia," reported: "9th, very stormy and unsettled weather; the barometer, which had been falling for the last thirty hours, reached its lowest reading at 8 p. m. (Greenwich mean time), when it read 28.14 (714.7), after which it began to rise, but very slowly. (Ship's position, lat. 55° 15' N., long. 14° 0' W.) Very heavy rain at times, during which the wind would veer to w. but soon backed to ssw. again with terrific sea from wsw. About midnight the wind came from wsw. with hurricane force; kept running before the gale all night and until 10 a. m. of the 10th, when I rounded ship, head to wind, and remained so for twelve hours before the gale moderated." On the 9th vessels on the fiftieth parallel and between W. 10° and 20° reported westerly winds of hurricane force throughout the day. On the 10th the two disturbances, having apparently united, were central as a deep depression of great energy off the western coast of Scotland, the lowest reported barometer reading being 28.33 (719.6). Strong sw. to w. gales prevailed over the British Isles, the North sea, and northern France.

IV.—The presence of this depression was well indicated on the morning of the 8th, near N. 50°, W. 35° to 40°, by the shifting of the wind to ssw. and sw. and the rapid decrease in pressure which had occurred, the barometer have fallen to 29.0 (736.6).

Captain Malet, commanding the s. s. "Marengo," reported: "8th, noon (N. 49° 48', W. 34° 05'), barometer 28.96 (735.6), hard sw. by s. gale, very high sea; 1 p. m., wind veering to wsw. with hard squalls and hail, force 8; 2 p. m., wind w. force 9, tremendous sea breaking heavily between squalls; 6 p. m., wind veered to wnw. in squalls of hurricane force, attended with hail; gale continued throughout the day, force 8 to 9."

On the 8th the s. s. "Iowa," S. Walters commanding, in N. 47° 43', W. 36° 11', had barometer 29.19 (741.4), wind wsw., force 7, cloudy weather and high w. sea, and on the same date the s. s. "Devonia," H. Young, commanding, in N. 51° 12', W.

34° 57', reported barometer, 29.22 (742.2), wind ssw., force 6, cloudy weather and heavy sw. swell. The disturbance moved northeastward, and as the barometric gradient rapidly increased to the westward, the westerly and northwesterly winds attained almost hurricane force, causing a very high westerly sea. The s. s. "Marengo," which was steaming to the westward reported: "on the 9th, (N. 49° 07', W. 35° 51') barometer, 29.68 (753.9), wind wnw., force 9; at 10 a. m. a heavy sea carried away star-board boats, rails, ventilators, funnel shrouds, etc.; at noon, wind decreasing, sea still high, squalls very violent; midnight, wind force 8, gale continued until noon of the 10th, wind nw. to wnw., force 7 to 8, with frequent squalls of snow and hail."

On the 9th the disturbance was central near N. 53°, W. 20°, the region between N. 42° and 56° and from W. 40° eastward to W. 10° was under the influence of the two disturbances, iii. and iv., and heavy gales prevailed over the area mentioned.

On the 9th the s. s. "Belgenland," J. Stokes commanding, reported: "on the 9th and 10th, between N. 47° 12', W. 26° 25' and N. 47° 55', W. 18° 47', encountered a heavy gale with snow and hail squalls, wind veering gradually from sw. to nw. and at times increasing to hurricane force; very heavy sea running, which stove in three boats, a life-raft, and did considerable damage about the decks." The s. s. "Anchoria," J. J. Small, commanding, in N. 51° 12', W. 28° 38', experienced a very heavy w. gale with terrific squalls of wind and hail, and heavy sea from nw., sw., and ene. Capt. H. C. Williams, commanding the s. s. "Oregon," in N. 49° 56', W. 24° 15', reported that some of the wind gusts were of hurricane force. In the above reports the barometer readings ranged from 29.0 (736.6) to 29.4 (746.7). Capt. C. Hebieh, commanding the s. s. "Wieland," reported: "at 1 a. m. of the 9th, wind blowing very hard and barometer falling; at noon (Greenwich time), in about N. 50°, W. 22° 30', it read 28.73 (729.7), at which time the velocity of the wind (nw.) was almost that of a hurricane; at 4 p. m. the barometer began to rise."

Capt. S. Norvell, commanding the s. s. "British Crown," furnishes the following observations taken during the gale:

Date.	Time.	Barometer.		Wind.		Sea-swell.		Remarks.
		Inches.	Mill.	Direction.	Force, 0-10	Character.	Direction.	
10.....	1.30	28.79	731.3	w.	7	heavy	west	Gloomy, threatening weather; lat. 50° 30' N., long. 15° 00' W.
10.....	3.38	28.71	729.2	w.	8	heavy	west	Gloomy, threatening weather; hove ship to.
10.....	7.30	28.74	730.0	w.	9	very heavy	west	Gloomy, threatening weather; kept ship before the sea; would not keep head on.
10.....	11.30	28.83	732.3	w.	10	mountainous	west	Gloomy, threatening weather; ship running before the sea.
10.....	15.00	29.19	741.4	w.	8	very heavy	west	Gloomy, threatening weather; ship running before the sea.
11.....	1.09	29.45	747.3	w.	7	heavy	west	Better appearance of the weather; lat. 50° 10' N., long. 14° 38' W.
11.....	4.10	29.46	748.3	w.	6	high	west	Sea going down; brought ship head to sea.

During the 10th, this depression probably merged with low area iii., which was then central north of the fifty-fifth parallel, and near the Scottish coast.

V.—This was a continuation of the disturbance charted as low area v., on chart i. It passed into the Atlantic during the 9th, and at midnight of that date, it was central southeast of Nova Scotia. On the morning of the 10th, the depression was near the southern part of the Banks, with the lowest barometer reading 29.64 (752.8); moderate s. and sw. winds prevailed between W. 50° and 40°. During the day the disturbance moved northeastward, with decreasing pressure at the centre, and appears to have overtaken and passed the s. s. "Llandaff City."

The following is furnished by Capt. T. L. Weiss, commanding that vessel:

Ship's date.	Ship's time.	Greenwich time.	Latitude N.	Longitude W.	Barometer.			Wind.		Remarks.
					Inches.	Millimetres.	Thermometer.	Direction.	Force, 0-10.	
10...	8 p. m.	h. m.	° ' "	° ' "	29.20	741.7	48	sw.	6	Ugly, threatening weather; rain.
10...	12 p. m.	2.39 a. m.	46 38	38 34	28.95	735.3	48	sw.	8	Clear; high sea.
11...	4 a. m.	6.25 a. m.	46 54	36 45	28.70	729.0	42	w.	9	Heavy gale and sea.
11...	10 a. m.	12.25 p. m.	46 58	36 36	29.05	737.9	44	nw.	9	Hail and snow squalls.
11...	2 p. m.	4.20 p. m.	.....	.....	29.25	742.9	46	nw. by n.	9	Do.
11...	8 p. m.	10.26 p. m.	.....	.....	29.25	742.9	40	nw.	8	Do.
11...	12 p. m.	2.24 a. m.	47 22	36 28	29.25	742.9	38	nw.	8	Do.
12...	4 a. m.	6.22 a. m.	.....	.....	29.20	741.7	36	nw.	8	Do.
12...	8 a. m.	10.20 a. m.	.....	.....	29.20	741.7	35	nw.	7	Do.
12...	12 m.	2.17 p. m.	47 40	34 33	29.30	744.2	42	nw.	9	Very heavy squall.
12...	8 p. m.	10.12 p. m.	.....	.....	29.42	747.3	.....	nw. by n.	7	At 11 a. m. a small whirlwind passed, travelling from ne. to sw.

The passage of this depression is shown in the report of the s. s. "Marengo," by the decrease of pressure which occurred on the 11th. After that vessel got clear of depression number iv., the barometer began to rise and the westerly wind decreased in force, but at 6 p. m., of the 10th, the wind hauled to the southward, with heavy sky and much rain, barometer (a) 28.76 (730.5), falling; 10 p. m., wind se., force 5, raining; midnight, wind sw., veering to wsw., force 6, barometer 28.56 (725.9), falling rapidly, sky clearing; ship hove to, head to ssw. (ship's position probably about N. 47° 30', W. 38°). At 2 a. m. of the 11th the barometer read 28.44 (722.4), falling, wind wsw., force 8, upper clouds moving rapidly, high irregular sea; 3 a. m., barometer 28.28 (718.3), steady, wind blowing a hurricane from wnw.; 6 a. m., hard nw. gale, squalls of great violence, attended by hail and snow, very high sea; 8 a. m., stove starboard gangways, wind wnw., force 9, stopped engines, ship driving to the se. under storm forestay-sail. At noon wind veered to nw. The gale continued, with slight variation in force or direction, until the 13th, when the barometer began to rise and the wind moderated. The ship's position was from N. 48° 45', W. 36° 19', on the 10th, to N. 46° 50', W. 39° 55', on the 13th.

Captain A. Jaeger, commanding the s. s. "Nürnberg," between N. 44° 19', W. 35° 33', and N. 47° 50', W. 21° 49', furnishes the following report:

Date.	Greenwich mean time.	Barometer.		Wind.		Remarks.
		Inches.	Mill.	Direction.	Force, 0-10.	
10.....	6.00 p. m.	29.90	759.7	ws.	4	Overcast, misty; high nw. swell.
10.....	10.00 p. m.	29.65	753.1	ss.	6-7	Increasing wind; high sw. and nw. swell.
11.....	2.00 a. m.	29.24	742.7	s. by w.	7-8	Misty, light rain; high sw. swell.
11.....	6.00 a. m.	29.08	738.6	ws.	7-9	Overcast, rain squalls; wind shifting at 4 a. m. to wsw.
11.....	8.00 a. m.	29.01	736.8	ws.	7-9	Overcast, misty; high sea from w.
11.....	9.00 a. m.	29.01	736.8	ws.	7-8	Do.
11.....	10.00 a. m.	29.03	737.3	w. by n.	7-8	Do.
11.....	2.00 p. m.	29.03	737.3	wnw.	7-8	Overcast; hard storm; high sea from w.
11.....	6.00 p. m.	29.04	737.6	w.	7-8	Do.
11.....	10.00 p. m.	29.04	736.7	w.	7-8	Hard storm; heavy breakers from sw. w. and nw.; strong hail squalls and rain of short duration; lightning in se.
12.....	2.00 a. m.	29.00	736.6	w-ww.	7-8	Do.
12.....	5.00 a. m.	28.98	736.1	w-ww.	7-8	Do.
12.....	6.00 a. m.	28.99	736.3	w-ww.	7-8	Do.
12.....	10.00 a. m.	29.05	737.9	ws.	7	Less wind and sea; thunder and lightning in e.; barometer rising steadily.
12.....	2.00 p. m.	29.08	738.6	ws.	7	Do.

During the 11th and 12th the disturbance continued its northeasterly course with undiminished energy; the following reports of the steamers "Wieland," and "Sardinian," indicate

that those vessels encountered its greatest fury: The "Wieland," in N. 49° 18', W. 31° 15', at 11 a. m. (Greenwich time) of the 11th, reported barometer 28.12 (714.2) wind sw., force 10; the wind then shifted to nw. and blew a complete hurricane, accompanied by hail and snow, with very heavy sea. Captain Dutton, of the "Sardinian," reported as follows: "11th (about N. 53° 56', W. 18° 55'), highest reading of the barometer 29.19 (741.4), at 11.30 a. m. (Greenwich time), when it began to fall and the wind backed to se. by e., and at 5.30 p. m. it was blowing a whole gale, sky overcast, lightning in the sw. quarter. Just before sunset the sky cleared at the horizon, under the sun, and the clouds seemed to be rolling over and through each other, presenting a very wild appearance. At 6.30 p. m., wind se. by s., force 10, barometer 28.72 (729.5); 8.30 p. m., wind s. by w., force 10, barometer 28.67 (728.2); 11.30 p. m., barometer 28.61 (726.7), wind sw. by s., force 10. At 6.30 a. m. of the 12th the barometer reached its lowest reading, 28.38 (721.1); 9.30 a. m., wind wsw., force 10, barometer 28.44 (722.4). At noon (N. 53° 2', W. 21° 52'), gale moderating, barometer 28.59 (726.2), steadily rising." On board the s. s. "British Crown," on the 12th, in N. 49° 10', W. 18° 08', the barometer fell to 28.95 (735.3), but the wind, which was sw. by w., did not exceed force 7. By the 13th the disturbance was central off the northwest coast of Ireland, causing moderate gales over the British Isles and North Sea; the barometric pressure near the centre of disturbance, as reported by Captain Le Gallais, commanding the s. s. "Grecian," (about N. 55°, W. 12°) was 28.78 (731.0), wind ssw., strong gale, with hard squalls of hail and very vivid lightning.

VI.—This disturbance, which is noteworthy because of its slow eastward movement and the violence which it exhibited during its prevalence, was first observed near N. 40°, W. 35°, on the 13th. Captain Andreasen, commanding the bark "Cato," in N. 39° 45', W. 35° 40', reported as follows: "13th, at 10.30 a. m., Greenwich time, the barometer read 29.89 (759.2) and was falling rapidly (the decrease in pressure since the observation of the 12th was about .45 inch); the strong wsw. wind veered to sw., and continued with increasing force, accompanied by rain. At 2.30 p. m. barometer 29.26 (743.2), violent storm with dangerous sea; at the same time the wind suddenly shifted to nw. and blew with great fury, accompanied by hurricane-like squalls. The barometer then began to rise; at 10.30 p. m. it read 29.89 (759.2), but the wind continued to blow with unabating force until 6 a. m. of the 14th, when it gradually moderated to a strong breeze." During the 13th the disturbance moved northeastward with decreasing pressure and increasing energy, and by the 14th the region of least pressure was near N. 47°, W. 22°. Captain Weiss, commanding the s. s. "Llandaff City," which vessel was in the western semi-circle of the depression, furnishes the following: "During the 13th the glass was very low and the weather looked threatening, wind gradually hauling to ne., and increasing in force at midnight."

Ship's date.	Ship's time.	Greenwich time.	Latitude N.	Longitude W.	Barometer (a.).		Wind.		Weather.
					Inches.	Mill.	Direction.	Force.	
13th.	4 p. m.	5.54 p. m.	48 21	28 42	29.25	742.9	unsteady.	0-1	Snow squalls.
"	8 p. m.	9.53 p. m.	.....	.....	29.20	741.7	nne.	6	
"	12 p. m.	1.48 a. m.	.....	.....	29.10	739.1	ne.	5	Ugly; threatening.
14th.	2 a. m.	3.45 a. m.	48 29	26 15	28.90	734.0	ne.	8	Increasing gale.
"	4 a. m.	5.45 a. m.	.....	.....	28.72	729.5	ne.	9	Heavy gale.
"	6 a. m.	7.45 a. m.	.....	.....	28.58	725.9	nne.	10	Hurricane.
"	8 a. m.	9.45 a. m.	.....	.....	28.65	727.7	n.	10	Hurricane.
"	10 a. m.	11.45 a. m.	.....	.....	28.76	730.5	nww.	10	Hurricane.
"	12 m.	1.44 p. m.	48 41	26 03	28.92	734.6	nw.	10	Hurricane.
"	4 p. m.	5.44 p. m.	.....	.....	29.10	739.1	nw.	9	Slight abatement.
"	12 m.	1.44 a. m.	.....	.....	29.30	744.2	nw.	9	Sea rising.

"At 7 p. m. a very heavy sea broke on board, sweeping the decks fore and aft, consequently observations were not followed up during the night. During the height of the gale the sea was not so high. Owing to the immense pressure of the

wind the sea could not rise, but the air was one mass of spray, so that an object could not be seen at more than a few yards distance." Later, the "Llandaff City" fell in with the s. s. "Strathleven," disabled in N. 48° 22', W. 22° 12', that vessel having encountered a hurricane from southeast.

The s. s. "Sardinian," in about N. 50° W. 30°, at 2 a. m. of the 14th, had ne. wind of force 8, barometer 29.42 (747.3); 4 a. m., wind n. by e., force 8, barometer 29.17 (740.9); 6 a. m., wind n. by w., force 8, barometer 29.19 (741.4); 11 a. m., wind nw. by n., force 8, barometer 29.61 (752.1). After that time the wind gradually settled down to a strong breeze with steadily rising barometer. The following report of the s. s. "British Crown," shows that the storm-vortex passed over, or very near to that vessel.

Report of s. s. "British Crown," S. Norvell, commanding, (Greenwich date and hours):

Date.	Time.	Barometer (a.).		Wind.		Remarks.
		Inch.	Mill.	Direction.	Force 0-10	
14.....	1 38	29.38	746.2	ws.	5	Cloudy, gloomy weather. Lat. 47° 30' N., long. 21° 42' W.
14.....	7 40	29.31	744.5	sw.	6	Cloudy, gloomy weather.
14.....	11 40	28.73	729.7	se.	7	Heavy rain; heavy se. sea; kept ship before it.
14.....	13 45	28.45	722.6	se.	9	Heavy rain; heavy se. sea; kept ship before it.
14.....	14 47	28.23	717.0	se.	10	Clearing; barometer falling rapidly.
14.....	15 48	28.03	711.9	se.	10	Hurricane; mountainous se. sea; fine, clear weather.
14.....	16 48	27.98	710.7	var.	1	Very high, confused sea; lowest barometer reading; wind shifting by s. to sw. and wnw.; fine, clear weather.
14.....	18 30	28.18	715.8	wnw.	10	Hurricane; very heavy, confused sea; ship not steering; going full speed; kept away before it.
14.....	24 00	28.73	729.7	wnw.	8	Heavy squalls.
15.....	1 45	28.93	734.8	wnw.	8	Heavy squalls; lat. 46° 41' N., long. 23° 05' W.
15.....	6 00	29.16	740.7	wnw.	7	Brought ship to wind and sea.

Very heavy s. to se. gales prevailed over the ocean eastward to W. 12°, while equally furious nw. gales prevailed to the westward of the twenty-second meridian.

The s. s. "Canada," J. Robinson, commanding, reported on the 14th, in about N. 49°, W. 14°, at 3 h., barometer 29.20 (741.9), wind se., force 10, cloudy weather, dangerous sea; 4 h., barometer 29.15 (740.4), wind s., force 10; 6 h., barometer 29.05 (737.9), wind s., force 9, gloomy, raining; 8 h. 30 m., barometer 29.15 (740.4), wind s., force 8; barometer gradually rising, with finer weather. The s. s. "Rhyndland," also appears to have been very near the centre of disturbance during the 14th, as shown by the following report furnished by Captain J. C. Jamison: "14th, midnight till 8 a. m., wind sse., increasing, barometer falling rapidly, heavy confused sea, squalls of rain and sleet, heavy lightning in the sw. and ssw., barometer at 8 a. m. 28.44 (722.4). From 8 a. m. till noon, violent gale from se. with steady rain, sky quite dark, very heavy sea from se., flooding decks fore and aft, barometer rising slowly, at noon 28.58 (725.9). From noon till 12.30, (about N. 49° 48', W. 24° 00'), wind suddenly moderating and flying about in all directions; at 12.30 the wind settled in the nw. and blew with the same force as before, until 4 a. m. of the 15th. High sea breaking in all directions over the vessel, violent hail and snow squalls, lightning in the sse. and se., barometer at midnight, 29.52 (749.8)." The s. s. "America," which was on the same meridian (W. 24°), but about 2° farther south (N. 47°) than the "Rhyndland," at noon of the 14th, had barometer 29.06 (738.1), wind nw., force 10.

The disturbance moved slowly northward during the day, and on the 15th it was central near N. 50°, W. 18°; the strong se. and sse. gales continued to the eastward of the fifteenth meridian, and were accompanied by continuous rain. On the 16th a slight increase of pressure appears to have occurred over the ocean between the Irish coast and W. 20°, and during the 16th and 17th the depression was apparently forced to the westward and southward. The following reports indicate the

severity of the storm during those days: s. s. "Helvetia," J. W. Rogers, commanding, in N. 50° 36', W. 20° 46', on the 16th, reported: "noon, barometer 29.39 (746.5), falling, wind sw.; 9 p. m., wind veering suddenly to nw., barometer 29.32 (744.7), wind force 3; midnight, barometer 29.26 (743.2), wind varying from nw. to ne., force 4. 17th, 6 a. m., barometer 29.13 (739.9), wind nw., force 5, hauling to ene.; 8 a. m., barometer 28.89 (733.8), wind force 6; 10 a. m., barometer 28.76 (735.9), wind nne., force 7; noon, (N. 49° 38', W. 27° 03'), barometer 28.67 (728.2), wind n., force 8; 4 p. m., barometer 28.81 (731.8), wind n. by w., force 7; 6 p. m., barometer 28.88 (733.5) wind n., force 8, and squalls of force 9; midnight, barometer 29.27 (743.4), wind nnw., force 7, hail and snow squalls, barometer steadily rising and gale decreasing." Captain Robinson, commanding the s. s. "Canada," furnishes the following observations:

Date.	Time.	Barometer (a.).		Wind.		Sea-swell.	Weather.
		Inch.	Mill.	Direction.	Force 0-10		
16.....	14 00	29.30	744.2	ssw.	5	moderate	Cloudy.
16.....	15 00	29.10	739.1	s.	5	rough	Cloudy.
16.....	16 00	28.70	729.0	se.	5	rough	Cloudy.
16.....	19 00	28.32	719.3	e.	7	high; dangerous	Wind suddenly shifting to ne.; forcing squally.
16.....	20 00	28.50	723.9	wnw.	8	tempestuous	Squally.
16.....	22 00	28.76	730.5	nw.	10	tempestuous	Fierce squalls.
16.....	24 00	28.82	732.0	nw.	10	very heavy	Heavy squalls; lat. 47° 11' N., long. 28° 33' W.
17.....	6 30	29.20	741.7	nw.	8	very heavy	Barometer slowly rising; gale moderating.

Captain Schoonhoven, commanding the s. s. "Daniel Steinmann," reports as follows, (compass bearings true; ship's time): "February 17th, baffling winds, from 1 till 3 a. m., hazy sky and heavy swell from se.; 4 a. m., wind se., force 6, barometer 29.22 (742.2); 5 a. m., wind ese., force 7; barometer 29.12 (739.6); 6 a. m., wind e., force 6, barometer 28.87 (733.3); 7 a. m., wind ene., force 6, heavy rain, barometer 28.62 (726.9); 8 a. m., wind nne., force 2 to 3, barometer 28.50 (723.9); at 8.30 a. m., the wind suddenly broke out from n., force 10, causing in a few hours a very high sea, which compelled me to heave the ship to with head to the nne., no sky or horizon to be seen. At noon, latitude 47° 40', N. longitude 28° 3' W., wind n., force 10, (hurricane), barometer 28.37 (720.6)—this was the last reading; at 1 p. m., shipped a breaker, smashing chart-room, wheel-house, two life-boats, and partly filling the engine-room and stoke-hole; at 2.30 p. m., ship running before the storm and steering se., wind now nw. by n., force 10, with hurricane squalls of snow and hail; from 5 p. m. till midnight, wind moderating and sky breaking up." Captain T. Amlot, commanding the s. s. "Mentmore," reported: "17th, noon (N. 49° 10', W. 25° 59'), blowing a hard gale from se., with high sea; it fell calm for ten minutes, and the sea seemed to boil around the ship; the wind then burst out in a hurricane from nne.; at 2 p. m. the wind and sea were so terrific that we had to run the ship before it until midnight, wind having then hauled to nw., blowing a steady gale. The lowest reading of the aneroid during the calm was 28.40 (721.3); at 4 p. m. it began to rise gradually." During the 18th the disturbance apparently moved northeastward, retaining much of its violence, especially in the western quadrants. On the 19th it appeared off the southern coast of Ireland, but it displayed greatly diminished energy, although another storm had apparently formed to the westward.

VII.—On the 19th the wind shifted to southerly and a decrease of pressure occurred over the ocean between N. 45° and 55°, and W. 20° and 25°. The s. s. "Ohio," H. Morrison, commanding, in N. 50° 17', W. 23° 00', reported barometer 29.15 (740.4), wind sse., force 8, overcast; and the s. s. "France," Périer d'Hauteville, commanding, in N. 49° 15', W. 22° 48', barometer 29.39 (746.0), wind s., force 6, veering during the day to w., strong wind, rain and sleet and very high sea. During the 19th strong nw. gales continued between

W. 25° and 35°. By the 20th northwesterly winds prevailed on the fiftieth parallel, and from W. 25° to 20°, with the pressure about 29.35 (745.5). By the 21st the disturbance was off the western coast of Ireland, and during the 22d and 23d it moved northeastward to northern Scotland, the pressure near the centre being about 29.2 (741.7).

VIII.—This was a continuation of the depression charted as low-area viii. of chart i. During the 18th, it passed off the Atlantic coast to the southward of Nova Scotia, and during the 19th, 20th, and 21st, it moved eastward without exhibiting any great storm-energy and apparently filled up on the last-mentioned date.

IX.—This was a continuation of low-area xi., of chart i. During the 23d it moved up the Atlantic coast, developing considerable energy, as shown by the following reports: the ship "E. J. Spicer," Geo. D. Spicer, commanding, reported: "23d (in about N. 37° 30', W. 64° 30'), 8 p. m., Greenwich mean time, a gale began from s., accompanied by thunder, lightning, and heavy rain. From midnight of the 23d, until 3 a. m. of the 24th, it blew a hurricane, lowest barometer, 29.33, (745.0); after that, the wind moderated and hauled to the westward, and the barometer rose rapidly." The s. s. "Venice," in N. 37° 20', W. 64° 34', reported on the 23d, a hurricane from se. to sw. and nw., lasting twenty-three hours, vessel lost one boat and several sails. In N. 37°, W. 71°, the bark "Liberia" had a hurricane from se. to s. and w., lasting twenty-four hours, with thunder and lightning. Several other vessels reported heavy weather in the Gulf stream. By the 24th, the disturbance was near Cape Breton island, having combined with a disturbance (xi.), which had moved over the United States and Canada. Strong w. gales prevailed to the southward of Nova Scotia, while moderate southerly winds were reported to the eastward of W. 65°; by the 25th, the region of least pressure was between N. 45° and 50°, and W. 35° and 30°, over that region the barometer ranged from 29.4 (746.7) to 29.7 (754.4) with westerly winds near N. 45°, easterly to the northward of N. 50°, and southerly between W. 34° and 15°. The winds remained moderate in force in all quadrants of the depression during the 25th, but on the following day, they increased to a moderate gale. On the 27th, the disturbance was central near N. 52°, W. 27°, and during the 28th and 29th, it appears to have moved southeastward toward the Bay of Biscay.

X.—This was a continuation of the depression traced as low area xiii. on chart i. On the morning of the 27th the disturbance was central off the coast of Nova Scotia, having been joined by a subsidiary disturbance, which had moved up the Atlantic coast during the 26th, causing strong easterly gales near the fortieth parallel. On the 27th the s. s. "Pennland," R. Weyer, commanding, in N. 41° 20', W. 57° 16', reported barometer 28.91 (734.3); in the evening the wind set in from the se., with rain, veering through s. to wsw., heavy gale and confused sea. Captain T. Jüngst, commanding the s. s. "Rhein," reported: "27th to 28th, from N. 43° 7', W. 53° 48' to N. 42° 55', W. 56° 0', sw. storm with very high, dangerous sea; lowest barometer, 29.04 (737.6); heavy squalls, with hail. At midnight of the 27th the wind shifted from s. and sw. to nw." The disturbance moved northeastward, and on the 28th the storm-centre was near N. 48°, W. 42°, the lowest reported barometric reading being 29.21 (741.9). On the 29th, the disturbance was central near N. 50°, W. 35°, the pressure ranging from 29.2 (741.7) to 29.4 (746.7), with moderate w. and nw. gales to the westward.

OCEAN ICE.

Chart ii. also exhibits the southern and eastern limits of icebergs observed in the north Atlantic ocean during the month of February and up to March 12th. This chart is based on reports communicated by shipmasters to this office; reports furnished through the co-operation of the "New York Herald Weather Service," and other data published by the "New York Maritime Register."

During the period from February 14th to March 12th ice-

bergs have drifted southward as far as N. 42° and eastward to W. 43°. The most dangerous region, as indicated by the reports, extended from about N. 42° 50', W. 51° 00', northeastward to N. 45° 00', W. 46° 00'; within this area many immense ice-fields, studded with numerous large icebergs, were observed.

Compared with the chart for the preceding month (January-February), a marked change is observable, especially as regards the eastern limit of the ice-region. The southern limit is about 1° south of that for last month, it also extends farther westward and eastward; the eastern limit of the region has moved about 2° 30' east of that for January-February; at the same time the reports indicate a great increase in the size and number of both ice-fields and bergs.

A comparison with the chart for the same period in 1883 shows that, although there is no material change in the positions of the extreme southern and eastern limits of the ice-region, yet its southeastern corner reaches a lower latitude than in 1883. In that year most of the ice reported to the eastward of W. 47° was north of the forty-fifth parallel; this year the easternmost icebergs were observed to the southward of N. 44°.

Icebergs and field-ice were reported as follows:

February, 2d.—S. S. "Wyoming," from N. 45° 50', W. 48° 22', to N. 45° 07', W. 48° 51', passed through large quantities of field-ice.

4th.—S. S. "State of Georgia," in N. 45° 16', W. 48° 13', came up with several large patches of loose field-ice which extended n. and s. as far as could be seen from the topsail yard. It extended eastward to N. 45° 23', W. 47° 24'.

13th.—S. S. "Daniel Steinmann," in N. 45° 16', W. 44° 22', passed near a very large iceberg.

14th.—S. S. "Wieland," in N. 46° 50', W. 43° 45', passed a large iceberg.

15th.—S. S. "Wieland," in N. 45° 44', W. 47° 43', passed through several fields of floating ice.

16th.—S. S. "Rhyndland," between N. 45° 12', W. 46° 58', and N. 44° 00', W. 48° 50', passed a number of icebergs, some quite large; also, in N. 44° 22', W. 48° 25', passed quantities of light field-ice. S. S. "Marengo," in N. 44° 18', W. 48° 40', passed three icebergs and a quantity of field-ice; many seals were seen; vessel steamed s. for two hours into open water.

17th.—S. S. "Brooklyn City," in N. 43°, W. 48°, fell in with field-ice and had to steer sse. for twelve hours to clear it. S. S. "Frisia," in N. 44° 04', W. 49° 05', passed rough field-ice. S. S. "Sardinian," entered loose field-ice in N. 44° 23', W. 48° 48'; cleared it in N. 43° 35', W. 49° 00'.

18th.—S. S. "Wisconsin," in N. 43° 47', W. 48° 33', passed an iceberg about five hundred feet long and thirty feet high; also a quantity of field-ice.

19th.—S. S. "Amerique," in N. 44° 05', W. 51° 30', passed five icebergs. S. S. "Richmond Hill," in N. 43° 41', W. 46° 31', passed a large iceberg and saw several others, together with much field-ice.

20th.—S. S. "City of Richmond," in N. 43° 10', W. 48° to 49°, sighted seven icebergs, one about two hundred feet long and about thirty feet high. S. S. "Egyptian Monarch," in N. 43° 52', W. 48°, passed nine icebergs and much drift ice. S. S. "Grecian," in N. 44° 25', W. 46° 12', passed a very large flat iceberg. S. S. "Salier," between N. 44° 56', W. 47° 51', and N. 43° 40', W. 49° 45', passed numerous icebergs and immense ice-fields. S. S. "Republic," in N. 44° 15', W. 46° 11', passed two pieces of ice.

21st.—S. S. "Adriatic," in N. 43° 39', W. 49°, passed four icebergs and a quantity of field-ice. S. S. "Edam," in N. 43° 40', W. 47°, passed many icebergs and much field-ice. S. S. "State of Nebraska," in N. 43° 52', W. 45° 26', passed a very large iceberg.

22d.—S. S. "Arizona," in N. 42° 54', W. 49° 20', passed three icebergs, each about forty feet high and four hundred feet long.

23d.—S. S. "France," in N. 44° 27', W. 45° 59', passed two icebergs. S. S. "Assyrian Monarch," in N. 42° 45', W. 49° 35', passed three icebergs, and a few miles farther west passed a

quantity of field-ice. S. S. "Hohenstaufen," from N. 43° 28', W. 48° 26', to N. 42° 56', W. 49° 25', passed through large fields of ice and saw several icebergs. S. S. "Ohio," in N. 44° 40', W. 45° 40', saw an iceberg; at midnight fell in with field-ice, and got clear of it on the 24th in N. 42° 36', W. 50° 00'. S. S. "Gloucester," in N. 44° 02', W. 47° 18', sighted numerous icebergs and field-ice; steamed southward, and on the 24th was surrounded by field-ice; had port bow damaged. Bark "Geo. Peabody" was abandoned in the ice in N. 42° 22', W. 48° 57', with bows stove and rudder damaged. S. S. "Circassian," in N. 43° 50', W. 46° 05', passed a large quantity of field-ice; to the northward the ice appeared closely packed, with several large bergs amongst it.

24th.—S. S. "Ohio," in N. 42° 30', W. 51° 00', passed an iceberg about seventy-five feet high and a quarter of a mile long. S. S. "Circassian," in N. 43° 21', W. 47° 17', passed a large iceberg; in N. 43° 10', W. 49° 06', met light field-ice, and in N. 42° 20', W. 51° 00', sighted an iceberg to the northward.

25th.—S. S. "California," in N. 42° 05', W. 49° 45', passed an iceberg and some field-ice. S. S. "Wieland," in N. 42° 13', W. 50° 20', passed some field-ice.

26th.—S. S. "State of Alabama," in N. 44° 13', W. 48° 56', fell in with large quantities of field-ice, which extended to N. 42° 31', W. 49° 31'; also passed several icebergs. S. S. "Servia," in N. 43° 14', W. 48° 13', passed several icebergs and much field-ice. S. S. "Pennland," from N. 43° 34', W. 48° 37', to N. 42° 10', W. 50° 36', passed six icebergs and large fields of ice. S. S. "Rhein," in 44° 25', W. 45° 37', passed a large iceberg; also in N. 43° 53', W. 48° 40', passed fifteen others; in N. 43° 45', W. 49° 10', met an enormous field of ice—could not see open water; the field was about thirty-six miles in length.

27th.—S. S. "Azalea," in N. 47°, W. 44°, passed several icebergs.

28th.—S. S. "Norseman," at Boston, reported that from N. 43° 30' to N. 42°, and from W. 47° to W. 50°, she steamed along a solid wall of ice for a distance of one hundred and ten miles; at the same time a large number of icebergs were in sight, extending as far as the eye could reach; some of the bergs were apparently one hundred feet high. S. S. "Baltic," in N. 43° 32', W. 47° 54', passed an iceberg. Bark "Cuba," in N. 42° 33', W. 51° 00', passed twenty-five icebergs.

29th.—S. S. "Baltic," in N. 42° 42', W. 50° 34', passed a very large iceberg; also in N. 42° 36', W. 51° 12', passed several large bergs. S. S. "Catalonia," between N. 42° 35', W. 50° 20', and N. 42° 27', W. 51° 32', passed several icebergs and a large ice-field. S. S. "Labrador," in N. 42° 30', W. 50° 20', passed a number of icebergs and large fields of ice. S. S. "Lord Gough," in N. 43°, W. 47°, passed five icebergs.

March, 1st.—S. S. "Azalea," in N. 42°, W. 50°, passed several icebergs.

2d.—S. S. "Pavonia," between N. 42° 12', W. 50° 20', and N. 42° 05', W. 50° 54', passed seven icebergs. S. S. "Persian Monarch," in N. 44° 09', W. 45° 00', passed a number of icebergs. S. S. "Abyssinia," from N. 42° 50', W. 48° 00', to N. 42° 30', W. 52° 10', passed from sixty to seventy large and small icebergs and many detached pieces of ice.

3d.—S. S. "Geiser," in N. 43°, W. 52°, saw about twenty icebergs. S. S. "Rialto," between N. 44° 24', W. 47° 02', and N. 43° 29', W. 50° 50', passed many icebergs.

S. S. "Main," between N. 44° 33', W. 45° 08', and N. 42° 24', W. 51° 25', passed a large number of icebergs and an ice-field about two miles long and twenty feet high; also several pieces of ice.

5th.—S. S. "Clintonia," in N. 45° 15', W. 45° 30', passed five icebergs.

6th.—S. S. "Britannic," in N. 42° 16', W. 48° 03', passed an iceberg about seventy feet high and two hundred and fifty feet long; also in N. 42° 06', W. 50° 13', passed two small bergs. S. S. "The Queen," between N. 42° 52', W. 48° 08', and N. 42° 45', W. 48° 55', passed several large icebergs and

a quantity of small ice. S. S. "Clintonia," in N. 43° 28', W. 50° 30', passed four large icebergs.

7th.—S. S. "Gallia," in N. 44° 00', W. 43° 30', passed an iceberg; also fifteen miles farther west passed a quantity of field-ice.

8th.—S. S. "Gallia," in N. 42° 34', W. 47° 23', passed an iceberg; also in N. 42° 10', W. 51° 25', passed another about twelve miles north of ship; also in N. 42° 08', W. 51° 51', passed three icebergs. S. S. "Furnessia," from N. 44° 26', W. 44° 15', to N. 44° 12', W. 44° 42', passed several small icebergs. S. S. "Italy," in N. 44° 20', W. 45° 40', passed several large icebergs. S. S. "Cornwall," between N. 43° 44', W. 47° 10', and N. 43° 20', W. 50° 18', passed a number of icebergs. S. S. "St. Laurent," in N. 44° 28', W. 46° 07', passed two icebergs; also in N. 43° 53', W. 48° 25', passed an ice-field.

9th.—S. S. "Italy," in N. 42° 35', W. 50° 22', passed two icebergs. S. S. "St. Laurent," in N. 43° 30', W. 50° 23', passed a small iceberg.

10th.—S. S. "Weser," at New York, reported, between N. 44° 30' and 42° 30' and W. 46° and 52°, passed numerous large icebergs. S. S. "Katie," in N. 43° 40', W. 44° 43', passed three icebergs, one of which was about forty feet and the others about thirty feet high.

12th.—S. S. "Grecian Monarch," in N. 42° 08', W. 50° 57', passed three icebergs.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada, for February, 1884, is exhibited on chart iii. by the dotted isothermal lines.

In the following table are shown the normal temperatures for February, the mean temperatures for February, 1884, and the departures from the normal in the several geographical districts, as deduced from the records of the Signal Service:

Average temperatures for February, 1884.

Districts.	Average for February. Signal-Service observations.		Comparison of Feb., 1884, with the average for several years.
	For several years.	For 1884.	
New England	28.2	31.6	3.4 above.
Middle Atlantic states.....	35.9	40.5	4.6 above.
South Atlantic states.....	49.8	54.9	5.1 above.
Florida peninsula.....	62.4	66.0	3.6 above.
Eastern Gulf states.....	53.1	55.5	2.4 above.
Western Gulf states.....	52.6	54.3	1.7 above.
Rio Grande valley.....	63.6	65.6	2.0 above.
Tennessee.....	44.4	47.3	2.9 above.
Ohio valley.....	36.6	39.4	2.8 above.
Lower lake region.....	26.2	27.2	1.0 above.
Upper lake region.....	21.8	17.7	4.1 below.
Extreme northwest.....	11.2	— 1.1	12.3 below.
Upper Mississippi valley.....	29.5	26.5	3.0 below.
Missouri valley.....	25.6	16.4	9.2 below.
Northern slope.....	24.1	12.8	11.3 below.
Middle slope.....	34.1	31.2	2.9 below.
Southern slope.....	49.1	50.4	1.3 above.
Southern plateau.....	40.0	47.5	7.5 above.
Northern plateau.....	32.4	27.2	5.2 below.
North Pacific coast region.....	41.5	36.1	5.4 below.
Middle Pacific coast region.....	50.0	47.6	2.4 below.
South Pacific coast region.....	56.0	56.2	0.2 above.
Mount Washington, N. H.....	6.2	14.1	7.9 above.
Pike's Peak, Colo.....	3.4	2.6	0.8 below.
Salt Lake City, Utah.....	31.4	31.3	0.1 below.

A line of normal temperatures extends from Lake Huron in a southwesterly direction to northern Arkansas and central Indian Territory, thence in a direction slightly north of west to Salt Lake City, Utah, and thence southwestward to the southern California coast. North of the line mentioned, the mean temperatures were below the normal, and south of it they were above. The departures below the normal were more marked than those above—ranging from 9° to 12° in the extreme northwest, northern slope, and Missouri valley. In the districts where the temperatures averaged above the normal, the departures were greatest in the middle and south Atlantic states, where they were 4° 6 and 5° 1, respectively. The distribution of the mean temperatures of February, 1884,

compared with that of the preceding month, shows a decided contrast in respect to departures from the normal. For January the districts of maximum departures below the normal were the Ohio valley, Tennessee, and the eastern Gulf states, while for February the mean temperatures in those districts averaged from 2°.4 to 2°.9 above the normal. In the extreme northwest, Missouri valley, and northern slope the mean temperatures for January averaged from 0°.9 above the normal in the last-named district to 3°.1 and 4°.2 below, respectively, in the Missouri valley and northern slope, while for February the departures in the same districts varied from 9°.2 to 12°.3 below the normal.

The general distribution of mean temperature and the districts of maximum departures from the normal for the month of February, in each year, from 1873 to 1883, inclusive, are as follows:

Districts.	Maximum departures.	Year.	Distribution.
		1873...	{ Above the normal in the Gulf states, in the eastern parts of Kentucky and Tennessee, and the southern parts of Ohio and Indiana, from 1° to 4°; below the normal in the other districts east of the Rocky mountains, from 1° to 8°.
		1874...	{ Normal in the upper Mississippi valley, lower lake region, and New England; below the normal in Minnesota and the Missouri valley; above the normal in the upper lake region, western Gulf states, and in the districts east of the Mississippi river south of the fortieth parallel.
Minnesota	-17.0	1875...	{ Below the normal over the whole country, the departures being least on the Pacific coast and in the south Atlantic states.
Upper lake region	-15.2		
Lower Missouri valley	-13.5		
Lower lake region	-12.3		
Saint Lawrence valley	-9.1	1876...	{ Normal in the lower lake region; below the normal in Minnesota and the Saint Lawrence valley; above the normal in all other districts east of the Rocky mountains.
Lower Missouri valley	+4.7		
Upper Mississippi valley	+4.6		
Ohio valley and Tennessee	+4.1		
Saint Lawrence valley	+3.0	1877...	{ Normal in the south Atlantic states; slightly below the normal in the Gulf states; above the normal in all other districts, the departures being least on the Pacific coast.
Minnesota	+13.4		
Upper Mississippi valley	+11.5		
Missouri valley	+10.9		
Upper lake region	+8.9	1878...	{ Below the normal at the Rocky mountain stations and in the Gulf states; above the normal in all other districts, the departures being least in the south Atlantic states and on the Pacific coast.
Saint Lawrence valley	+8.0		
Gulf states	+0.9		
Minnesota	+18.7		
Upper Missouri valley	+16.4	1879...	{ Normal in the north Pacific coast region and southern slope; below the normal in all other districts east of the Rocky mountains, excepting the northern slope and Canadian maritime provinces; also below the normal in southern California; above the normal in the western plateau districts and middle Pacific coast region.
Upper lake region	+10.7		
Lower Missouri valley	+8.9		
Gulf states	+2.6		
Rocky mountain stations	-2.3	1880...	{ Below the normal in the extreme northwest, Rio Grande valley, eastern Rocky mountain slope, and on the Pacific coast; above the normal in the lake region, Missouri, upper Mississippi, Ohio, and Saint Lawrence valleys, and in the states bordering on the Atlantic and Gulf coasts.
Northern slope	+2.9		
Canadian maritime provinces	+1.5		
San Francisco, California	+1.2		
Saint Lawrence valley	+6.4	1881...	{ Normal in New England, Florida, and the northern plateau; above the normal in the middle and southern plateau districts and on the Pacific coast; below the normal in all other districts east of the Rocky mountains, excepting New England and Florida.
New England	+4.6		
Missouri valley	+2.8		
Eastern Gulf states	+2.6		
Lower lake region	+6.5	1882...	{ Below the normal in the western plateau districts and on the Pacific coast; above the normal in all districts east of the Rocky mountains, the departures being least in New England and Florida.
Middle Atlantic states	+6.2		
South Atlantic states	+5.7		
Sacramento, California	+5.3		
Salt Lake City, Utah	+5.7	1883...	{ Normal in the Ohio valley; above the normal in Tennessee and in the middle and south Atlantic and eastern Gulf states; below the normal in all other districts, the departures being least in New England and the southern plateau.
Northern slope	+5.3		
Salt Lake City, Utah	+6.3		
North Pacific coast region	+3.7		
Middle Pacific coast region	+3.6	1884...	{ Below the normal in the western plateau districts and on the Pacific coast; above the normal in all districts east of the Rocky mountains, the departures being least in New England and Florida.
Lower Missouri valley	+0.0		
Upper Mississippi valley	+5.0		
Middle slope	+5.0		
Upper Mississippi valley	+9.9	1885...	{ Below the normal in the western plateau districts and on the Pacific coast; above the normal in all districts east of the Rocky mountains, the departures being least in New England and Florida.
Ohio valley	+8.8		
Tennessee	+8.7		
Middle plateau	+7.2		
Northern plateau	+5.8	1886...	{ Normal in the Ohio valley; above the normal in Tennessee and in the middle and south Atlantic and eastern Gulf states; below the normal in all other districts, the departures being least in New England and the southern plateau.
Middle Pacific coast region	+5.3		
Florida peninsula	+6.5		
South Atlantic states	+4.3		
Eastern Gulf states	+3.9	1887...	{ Normal in the Ohio valley; above the normal in Tennessee and in the middle and south Atlantic and eastern Gulf states; below the normal in all other districts, the departures being least in New England and the southern plateau.
Northern plateau	+16.6		
Middle slope	+12.8		
Northern slope	+8.8		

The following are some of the highest and lowest monthly mean temperatures reported from the Signal Service stations:

Stations reporting highest.	Stations reporting lowest.
Key West, Florida	Saint Vincent, Minnesota
Rio Grande City, Texas	Moorhead, Minnesota
Sanford, Florida	Fort Yates, Dakota
Brownsville, Texas	Bismarck, Dakota
Cedar Keys, Florida	Fort Buford, Dakota
Jacksonville, Florida	Pike's Peak, Colorado
New Orleans, Louisiana	Fort Assinaboine, Montana
Galveston, Texas	Huron, Dakota
Indianola, Texas	Fort Bennett, Dakota
Pensacola, Florida	Fort Custer, Montana
Savannah, Georgia	Duluth, Minnesota
Yuma, Arizona	Fort Benton, Montana
Mobile, Alabama	Fort Maginnis, Montana

MONTHLY RANGES OF TEMPERATURE.

The monthly ranges of temperature were greatest in the northern parts of Dakota, Montana and Idaho, in southeastern Colorado, and over an area including central-southern Oregon and northeastern California. They were least at stations along the coasts of the Atlantic and Pacific oceans and Gulf of Mexico.

Stations reporting monthly ranges of 70° or more are as follows: West Las Animas, Colorado, 94°; Fort Bidwell, California, 88°; Forts Buford and Yates, Dakota, and Fort Shaw, Montana, 85°; Fort Klamath, Oregon, 84°; Fort Bennett, Dakota, 83°; Cœur d'Alene, Idaho, 80°; North Platte, Nebraska, Linkville, Oregon, and Fort Spokane, Washington Territory, 79°; Fort Custer, Montana, and Cheyenne, Wyoming, 78°; Deadwood, Dakota, 77°; Huron, Dakota, and Denver, Colorado, 76°; Yankton, Dakota, 75°; Cantonment, Indian Territory, 74°; Fort Elliott, Texas, Lewiston, Idaho, Pittsburg, Pennsylvania, and Bismarck, Dakota, 73°; Helena, Montana, and Fort Huron, Michigan, 72°; Lake View, Oregon, Dodge City, Kansas, Detroit, Michigan, and Erie, Pennsylvania, 70°.

Monthly ranges of 45° or less occurred at the following stations: Oswego, New York, and Pensacola, Florida, 45°; Willcox, Arizona, New Orleans, Louisiana, Atlantic City, New Jersey, Smithville and Hatteras, North Carolina, Block Island, Rhode Island, 44°; Sanford, Florida, 43°; Los Angeles, California, Albany, New York, Point Judith, Rhode Island, Fort Macon, North Carolina, and Jacksonville, Florida, 42°; Portland, Maine, Chincoteague, Virginia, and Cape May, New Jersey, 41°; Cape Mendocino, California, Cedar Keys, Florida, and Eastport, Maine, 40°; Little Egg Harbor, New Jersey, 39°; San Francisco, California, 36°; Neah Bay, Washington Territory, 31°; Key West, Florida, 23°.

GREATEST DAILY RANGES OF TEMPERATURE.

The greatest daily ranges of temperature have varied in the different districts as follows:

New England.—From 26° at Eastport, Maine, and New London, Connecticut, on the 1st and 20th, respectively, to 32° at Provincetown, Massachusetts, on the 29th, and 44° on the summit of Mount Washington, New Hampshire, on the 20th.

Middle Atlantic states.—From 24° at Cape May, New Jersey, on the 28th, and at Atlantic City, New Jersey, on the 20th and 28th, to 30° at Cape Henry, Virginia, on the 14th.

South Atlantic states.—From 25° at Savannah, Georgia, on the 22d, to 34° at Kitty Hawk, North Carolina, on the 28th.

Florida peninsula.—From 14° at Key West, on the 27th, to 30° at Sanford, on the 28th.

East Gulf states.—From 23° at New Orleans, Louisiana, on the 27th, to 34° at Montgomery, Alabama, on the 19th.

West Gulf states.—From 26° at Indianola, Texas, on the 13th, to 34° at Galveston, Texas, and Fort Smith, Arkansas, on the 13th and 25th, respectively.

Rio Grande valley.—From 40° at Rio Grande City, Texas, on the 16th, to 42° at Brownsville, Texas, on the 13th.

Tennessee.—From 27° at Chattanooga, on the 14th, to 31° at Memphis and Nashville, on the 13th and 19th, respectively.

Table of maximum and minimum temperatures for February, 1884.

State or Territory.	Signal Service.			U. S. Army Post Surgeons, or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
Alabama.....	Mobile.....	76	29	Auburn.....	74	10
Do.....	Montgomery.....	81	22	Mt. Vernon Barke.....	80	24
Arizona.....	Willcox.....	89	45	Fort Lowell.....	86	20
Do.....	Fort Apache.....	69	8	San Simon.....	74	20
Arkansas.....	Little Rock.....	76	17	Lead Hill.....	73	0
Do.....	Fort Smith.....	75	10	Mount Ida.....	70	10
California.....	Los Angeles.....	51	38	Borden.....	97	28
Do.....	Fort Bidwell.....	67	-21	Summit.....	43	-7
Colorado.....	West Las Animas.....	71	-23	Fort Lyon.....	69	-23
Do.....	Pike's Peak.....	30	-30	Gunnison.....	36	-27
Connecticut.....	New Haven.....	53	1	Southington.....	48	1
Do.....	New London.....	52	3	Voluntown.....	55	0
Dakota.....	Yankton.....	52	-23	Fort Pembina.....	34	-37
Do.....	Fort Buford.....	45	-40	Fort Sully.....	57	-30
Delaware.....	Del. Breakwater.....	64	15	Rock Creek Bridge.....	74	11
District of Columbia.....	Washington City.....	70	9	Archer.....	86	36
Florida.....	Key West.....	83	60	Fort Barrancas.....	85	27
Do.....	Pensacola.....	74	29	Andersonville.....	81	26
Georgia.....	Augusta.....	76	24	Forayth.....	78	20
Do.....	Atlanta.....	73	11			
Idaho.....	Coeur d'Alene.....	60	-20			
Do.....	Lewiston.....	55	-18			
Illinois.....	Chicago.....	69	12	Golconda.....	69	8
Do.....	Indianapolis.....	53	-3	Polo.....	39	-12
Indiana.....	Indianapolis.....	65	-2	Laconia.....	70	3
Do.....	Indianapolis.....	65	-2	Fort Wayne.....	57	-7
Indian Territory.....	Cantonment.....	74	-1			
Iowa.....	Des Moines.....	54	-8	Logan.....	56	-10
Do.....	Dubuque.....	42	-8	West Bend.....	45	-23
Kansas.....	Dodge City.....	65	-5	Topeka.....	68	-3
Do.....	Leavenworth.....	57	-1	Allison.....	60	-20
Kentucky.....	Louisville.....	70	9	Frankfort.....	69	4
Louisiana.....	Shreveport.....	78	19	Grand Coteau.....	78	28
Do.....	New Orleans.....	77	33	Liberty Hill.....	71	22
Maine.....	Portland.....	49	8	Cornish.....	47	3
Do.....	Eastport.....	45	4	Orono.....	44	-8.4
Maryland.....	Baltimore.....	68	10	Receiving Reservoir.....	72	10
Do.....	Ocean City.....	55	15	Cumberland.....	62	3
Massachusetts.....	Boston.....	59	3	Westborough.....	60	2
Do.....	Provincetown.....	49	0	Princeton.....	52	-2
Michigan.....	Port Huron.....	64	-6	Swartz Creek.....	61	-16
Do.....	Mackinaw City.....	39	-17	Fort Brady.....	38	-29
Minnesota.....	Saint Paul.....	45	-18	Chester.....	40	-24
Do.....	Saint Vincent.....	30	-37	Hastings.....	37	-26
Mississippi.....	Vicksburg.....	80	23			
Missouri.....	Saint Louis.....	64	7	Peirce City.....	70	-6
Do.....	Fort Assinaboine.....	42	-35	Conception.....	53	-10
Montana.....	Fort Benton.....	53	-31	Fort Keogh.....	55	-38
Do.....	North Platte.....	59	-20	Fort Shaw.....	53	-32
Nebraska.....	Omaha.....	55	-12	Fort Niobrara.....	64	-38
Do.....	Omaha.....	55	-12	Fort Robinson.....	56	-39
Nevada.....	.....	.....	.....	Golconda.....	71	-17
Do.....	.....	.....	.....	Halleck.....	52	-45
New Hampshire.....	Mount Washington.....	39	-30	Bristol.....	48	-2
New Jersey.....	Sandy Hook.....	62	6	Vineland.....	67	10
Do.....	Atlantic City.....	55	11	Somerville.....	55	0.5
New Mexico.....	Fort Craig.....	70	9	Fort Union.....	67	-21
Do.....	Fort Stanton.....	68	4	Fort Wingate.....	56	-8
New York.....	New York City.....	61	2	Fort Niagara.....	57	-3
Do.....	Buffalo.....	55	-7	Humphrey.....	54	-15
North Carolina.....	Charlotte.....	75	18	Chapel Hill.....	70	-16
Do.....	Scotts Hill.....	78	24	Highlands.....	64	-4
Ohio.....	Cincinnati.....	67	6	Waverly.....	78	0.5
Do.....	Cleveland.....	64	-4	Hiram.....	60	-12
Oregon.....	Roseburg.....	68	3	Albany.....	66	8
Do.....	Fort Klamath.....	50	-34	Fort Klamath.....	56	-30
Pennsylvania.....	Pittsburg.....	70	-3	Leetsdale.....	65	0
Do.....	Erie.....	63	-7	Franklin.....	59	-12
Rhode Island.....	Block Island.....	54	10			
Do.....	Point Judith.....	47	4			
South Carolina.....	Charleston.....	.....	9	Aiken.....	76	18
Do.....	Charleston.....	.....	9	Stateburg.....	75	21
Tennessee.....	Knoxville.....	74	8	Highland.....	72	13
Do.....	Nashville.....	72	10	Ashwood.....	70	1
Texas.....	Rio Grande City.....	92	33	Cleburne.....	78	16
Do.....	Fort Elliott.....	74	2	Clarksville.....	75	10
Utah.....	Salt Lake City.....	53	-13	Terrace.....	60	-20
Do.....	Salt Lake City.....	53	-13	Promontory.....	55	-32
Vermont.....	.....	.....	.....	Dorset.....	57	-1
Do.....	.....	.....	.....	Burlington.....	49	-19
Virginia.....	Cape Henry.....	74	19	Johnsontown.....	70	19
Do.....	Lynchburg.....	69	11	Marion.....	68	0
Washington Territory.....	Fort Canby.....	68	6	Fort Spokane.....	49	-32
Do.....	Fort Spokane.....	47	-32	Fort Townsend.....	57	-8
West Virginia.....	.....	.....	.....	Helvetia.....	68	-2
Wisconsin.....	Milwaukee.....	45	-13	Wausau.....	36	-26
Do.....	La Crosse.....	43	-10	Evansville.....	47	-10
Wyoming.....	Cheyenne.....	50	-28	Fort Bridger.....	44	39

Ohio valley.—From 25° at Cincinnati, Ohio, on the 4th, to 39° at Pittsburg, Pennsylvania, on the 14th.

Lower lake region.—From 26° at Toledo, Ohio, Sandusky, Ohio, and Detroit, Michigan, on the 5th, 13th, and 14th, respectively, to 38° at Cleveland, Ohio, on the 20th.

Upper lake region.—From 27° at Grand Haven, Michigan, on the 27th, to 41° at Marquette, Michigan, on the 19th.

Extreme northwest.—From 38° at Fort Buford, Dakota, on the 28th, to 53° at Moorhead, Minnesota, on the 24th.

Northern slope.—From 32° at Helena, Montana, on the 17th, to 52° at Deadwood, Dakota, on the 17th.

Middle slope.—From 29° on the summit of Pike's Peak, Colorado, on the 19th, to 54° at West Las Animas, Colorado, on the 24th.

Southern slope.—From 38° at Fort Davis, Texas, on the 28th, to 46° at Fort Concho, Texas, on the 25th.

Southern plateau.—From 26° at Fort Grant, Arizona, on the 22d, to 43° at Fort Apache, Arizona, on the 24th.

Middle plateau.—31° at Salt Lake City, Utah, on the 15th.

Northern plateau.—From 27° at Boise City, Idaho, on the 14th, to 31° at Lewiston, Idaho, on same date.

North Pacific coast region.—From 25° at Portland, Oregon, on the 8th, and at Fort Canby, Washington Territory, on the 28th, to 32° at Olympia, Washington Territory, on the 13th, and at Roseburg, Oregon, on the 29th.

Middle Pacific coast region.—From 18° at San Francisco, California, on the 26th, to 36° at Red Bluff, California, on the 25th.

South Pacific coast region.—From 30° at Los Angeles, California, on the 23d, to 31° at Yuma, Arizona, on the 26th.

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average temperatures for February, 1884. The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: mean temperature, 38° 3, is 5° 1 below the February average of the two preceding years.

Illinois.—Mattoon, Coles county: mean temperature, 33° 5, is 1° 5 above the February average of the last five years.

Riley, McHenry county: mean temperature, 20° 5, is 1° 9 below the February average of the last twenty-three years. The mean temperature of the winter season of 1883-4, is 17° 8 or 3° 1 below the winter average of the last twenty-one years.

Anna, Union county: mean temperature, 38° 7, is 0° 6 below the February average of the last nine years.

Indiana.—Wabash, Wabash county: mean temperature, 30° 5, is 3° 4 below the February average of the last eight years.

Kansas.—Fort Scott, Bourbon county, mean temperature, 32° 2, is 2° 4 below the February average of the last four years.

Independence, Montgomery county: mean temperature, 31° 0, is 4° 2 below the February average of the last thirteen years.

Wellington, Sumner county: mean temperature, 26° 6, is 7° 9 below the February average of the last five years.

Lawrence, Douglas county: mean temperature, 28° 0, is 5° 2 below the February average of the last seventeen years.

Maine.—Gardiner, Kennebec county: mean temperature, 25° 5, is 4° 8 above the February average of the last forty-eight years.

Maryland.—Fallston, Harford county: mean temperature, 37° 4, is 5° 1 above the February average of the last thirteen years.

Massachusetts.—Worcester, Worcester county: mean temperature, 28° 3, is nearly 3° above the February average of the last forty-five years. The highest February mean of that period, 33° 9, occurred in 1842; the lowest, 18° 1, occurred in 1849.

New Jersey.—South Orange, Essex county: mean temperature, 33° 2, is 3° above the February average of the last fourteen years.

Moorestown, Burlington county: mean temperature, 36° 6, is 5° 2 above the February normal.

New York.—Palermo, Oswego county: mean temperature, 23° 8, is 2° 5 above the February average of the last thirty-one years.

North Volney, Oswego county: mean temperature, 26° 3, is 3° 6 above the average of the last sixteen years. The mean

temperature of the winter season of 1883-4, is 23°·1 or 0°·3 above the winter average of the last sixteen years.

Ohio.—Wauseon, Fulton county: mean temperature, 26°·2, is 2° below the February average of the last fourteen years.

Texas.—New Ulm, Austin county: mean temperature, 56°·3, 0°·4 below the February average of the last twelve years. The highest February mean of that period, 62°·0, occurred in 1882; the lowest, 52°·6, occurred in 1883.

Virginia.—Variety Mills, Nelson county: mean temperature, 43°·4, is 3°·5 above the February average of the last seven years.

Wytheville, Wythe county: mean temperature, 43°·1, is 6° above the February average of a period of twenty years.

West Virginia.—Helvetia, Randolph county: mean temperature, 40°·6, is 4°·3 above the February average of the last eight years.

LOW TEMPERATURES.

Atlanta, Georgia.—Very cold weather prevailed on the 11th; minimum temperature of that date, 11°.

Olympia, Washington Territory.—On the morning of the 11th the temperature fell to 2° at the signal office, and thermometers exposed on the hill in the southern part of the town showed a temperature of -5°, which is the lowest ever recorded in that locality.

Leadville, Colorado.—The 13th was the coldest day of the season; at 6 p. m. the thermometer indicated 30° below zero.

West Las Animas, Colorado.—A minimum temperature of -22°·7 occurred on the 14th, which is the lowest that has been recorded here since meteorological observations were begun in February, 1882.

Knoxville, Tennessee.—A minimum temperature of 7°·5 occurred on the 29th, which is the lowest recorded during February since 1873.

Milledgeville, Baldwin county, Georgia.—The minimum temperature on the last day of the month was 18°, which is remarkably low to occur at so late a date in this region.

Pensacola, Florida.—Very cold weather for the season prevailed on the 29th; minimum temperature, 29°.

Table of comparative minimum temperatures for the month of February.

State or Territory.	Minimum for February, 1884, Signal Service.		Minimum since Signal-Service stations were opened—3 to 13 years.			Lowest from any other source.			
	Station.	Temp.	Station.	Temp.	Year.	Place.	Temp.	Year.	Length of Record.
Alabama	Montgomery	0	Montgomery	0	1875	Huntsville	-17	.....	9 years.
Do	Mobile	22	Mobile	25	75, 76	Mount Vernon Arsenal	-13	.....	32 "
Arizona	Fort Apache	8	Prescott	-11	1880	Fort Canby (old)	-12	.....	12 "
Arkansas	Fort Smith	10	Little Rock	22	1881	Fort Bidwell	-4	1840	22 "
California	Cape Mendocino	28	Campo	16	1877	Fort Garland	-18	1868	19 "
Colorado	Pike's Peak	-30	Pike's Peak	-37	1875	Fort Lewis	-30	1880	30 "
Do	Denver	-15	Denver	-20	1881	Fort Yuma	-16	.....	86 "
Connecticut	New Haven	1	New Haven	-4	1881	Colebrook	-25	1861	14 "
Do	New London	3	New London	-3	1873	Fort Abercrombie	-40	'61, '69	16 "
Dakota	Fort Buford	-40	Pembina	-48	1876	Fort Pembina	-45	1875	7 "
Do	Fort Yates	-39	Fort Buford	-35	1879	Dover	-3	1875	0 "
Delaware	Delaware Breakwater	15	Delaware Breakwater	7	1881	Washington City	-5	.....	49 "
District of Columbia	Washington City	9	Washington City	-1·5	1875	Fort Barrancas	-11	.....	58 "
Florida	Pensacola	29	Saint Marks	28	1875	Augusta Arsenal	-2	1835	51 "
Georgia	Atlanta	11	Atlanta	21	1881	Atlanta	15	.....	4 "
Do	Augusta	24	Augusta	22	1875	Fort Hall	-13	1880	15 "
Idaho	Coeur d'Alene	-20	Eagle Rock	-29	1882	Winnebago	-20	.....	11 "
Illinois	Chicago	-3	Chicago	-13	1875	Belvidere	-31·5	1875	5 "
Do	Cairo	12	Cairo	4	1875	Spiceland	-21	1860	14 "
Indiana	Indianapolis	-2	Indianapolis	-8	1875	Fort Arbuckle	-4	'56, '57	20 "
Indian Territory	Cantonment	-1	Fort Supply	-8	1881	Fort Gibson	-12	.....	49 "
Do	Dubuque	-8	Fort Gibson	5	1875	Guttenberg	-37	1868	11 "
Iowa	Davenport	-4	Dubuque	-31	1875	Brookside	-35	1868	5 "
Do	Davenport	-4	Davenport	-16	1875	Fort Riley	-18	.....	22 "
Kansas	Dodge City	-5	Dodge City	-10	1881	Fort Leavenworth	-26	.....	50 "
Do	Leavenworth	-1	Leavenworth	-9	73, 75	Newport Barracks	-20	.....	29 "
Kentucky	Louisville	9	Louisville	0	1875	Fort Jessup	7	.....	23 "
Louisiana	Shreveport	19	Shreveport	22	75, 81	Baton Rouge	10	.....	57 "
Do	New Orleans	33	New Orleans	32·5	1875	Brunswick	-28	.....	53 "
Maine	Eastport	4	Eastport	-20	1876	Gardiner	-25	.....	34 "
Do	Portland	8	Portland	-7	74, 76	Fort McHenry	-6	1875	50 "
Maryland	Baltimore	10	Baltimore	2	1873	Deer Park	-10	1881	1 "
Massachusetts	Ocean City	15	Boston	-6·5	1876	Williamstown	-26	.....	61 "
Do	Boston	3	Springfield	-6	1880	Lunenburg	-20	.....	24 "
Michigan	Marquette	-29	Marquette	-32	1875	Fort Brady	-55	1875	59 "
Do	Escanaba	-20	Marquette	-27	1875	Ontonagon	-37	1861	11 "
Minnesota	Saint Vincent	-37	Saint Vincent	-35	1882	Fort Ripley	-43	.....	18 "
Do	Moorehead	-30	Breckenridge	-34	75, 79	Sibley	-37	1866	5 "
Mississippi	Vicksburg	23	Vicksburg	21	1875	Columbus	-14	.....	10 "
Missouri	Saint Louis	7	Saint Louis	-3	1875	Saint Louis	-25	1835	44 "
Montana	Fort Benton	-35	Fort Benton	-34	1873	Fort Ellis	-53	1872	13 "
Nebraska	North Platte	-20	North Platte	-23	1881	Fort McPherson	-24	1874	13 "
Do	Omaha	-12	Omaha	-16	1875	Camp Sheridan	-29	1881	5 "
Nevada	Winnemucca	-17	Winnemucca	-17	1882	Fort Ruby	-19	.....	6 "
New Hampshire	Mount Washington	-30	Mount Washington	-42	1876	Stratford	-37	1861	11 "
New Jersey	Sandy Hook	6	Atlantic City	-5	1875	Newark	-7	1861	14 "
Do	Atlantic City	11	Squad Beach	-5	1875	Paterson	-5	.....	6 "
New Mexico	Fort Stanton	4	Santa Fe	-3	79, 80	Fort Union	-21	1881	29 "
New York	Buffalo	-7	Albany	-18	1875	Sackett's Harbor	-46	1861	8 "
Do	Rochester	-6	Buffalo	-13	1875	Belleville	-34	.....	15 "
North Carolina	Charlotte	18	Wilmington	15	1875	Fort Johnson	3	.....	56 "
Do	Kitty Hawk	21	Kitty Hawk	11	1881	Fort Macon	-20	.....	16 "
Ohio	Cleveland	-4	Toledo	-12	1875	Hillsborough	-22	1838	35 "
Do	Sandusky	-3	Sandusky	-11	1875	Marietta	-18	.....	53 "
Oregon	Fort Klathath	-34	Umatilla	0	1881	Camp Warner	-16	1868	12 "
Do	Portland	7	Portland	24	1875	Camp Warner	-3	.....	7 "
Pennsylvania	Erie	-7	Erie	-16	1875	Lewisburg	-23	'65, '67	113 "
Do	Pittsburg	-3	Pittsburg	-12	1875	Philadelphia	-2	.....	35 "
Rhode Island	Narragansett Pier	4	Newport	-2	1881	Providence	-16	.....	105 "
South Carolina	Charleston	9	Charleston	26	1881	Charleston	22	.....	38 "
Do	Knoxville	8	Knoxville	6	1873	Glenwood Cottage	-4	.....	11 "
Tennessee	Fort Elliott	2	Fort Elliott	-1	1881	Fort McKavett	8	.....	28 "
Texas	Fort Davis	20	Fort Davis	0	1881	Camp Verde	9	1857	13 "
Do	Salt Lake City	-13	Salt Lake City	-3	1874	Camp Crittenden	-6	.....	3 "
Utah	Chinleogogue	18	Burlington	-18	1881	Randolph	-31	1868	5 "
Vermont	Lynchburg	11	Lynchburg	1	1881	Alexandria	3	1855	12 "
Virginia	Fort Spokane	-32	Spokane Falls	-3	1881	Fortrose Monroe	4	.....	49 "
Washington Territory	Fort Spokane	-32	Morgantown	-10	1875	Fort Colville	-20	.....	15 "
Do	La Crosse	-10	La Crosse	-34	1875	Helvetia	-6	1880	3 "
Wisconsin	Milwaukee	-13	Milwaukee	-32	1875	Fort Howard	-38	1823	31 "
Do	Cheyenne	-25	Cheyenne	-24	1874	Superior City	-38	1863	3 "
Wyoming	Cheyenne	-25	Cheyenne	-24	1874	Fort Fetterman	-40	1873	1 "

FROSTS.

Frosts occurred in the various districts on the following dates:

New England.—1st to 29th.

Middle Atlantic states.—1st to 5th, 8th to 11th, 14th to 29th.

South Atlantic states.—2d, 3d, 15th, 16th, 18th to 22d, 24th to 29th.

Eastern Gulf states.—2d, 15th, 20th, 21st, 22d, 24th, 25th, 29th.

Western Gulf states.—1st, 2d, 3d, 14th, 15th, 16th, 20th, 21st, 23d to 26th, 28th, 29th.

Tennessee.—1st, 2d, 3d, 5th, 9th, 13th to 16th, 19th to 29th.

Ohio valley.—1st, 2d, 3d, 10th, 13th to 16th, 19th to 22d, 25th, 27th, 29th.

Lower lake region.—1st to 4th, 7th, 16th, 21st, 22d, 24th, 28th, 29th.

Upper lake region.—1st to 29th.

Extreme northwest.—1st to 29th.

Upper Mississippi valley.—1st to 29th.

Missouri valley.—1st to 29th.

Northern slope.—1st to 29th.

Middle slope.—1st to 29th.

Southern slope.—9th, 28th.

Southern plateau.—9th, 10th, 12th, 13th, 14th, 17th, 19th to 29th.

Middle plateau.—1st to 29th.

Northern plateau.—1st, 6th, 7th, 8th, 10th to 14th, 25th to 29th.

North Pacific coast region.—1st to 18th, 23d, 26th to 29th.

Middle Pacific coast region.—5th to 14th, 18th, 21st, 22d, 23d, 25th, 27th, 28th, 29th.

Frosts were also reported at Yuma, Arizona, on the 13th and 14th, and at Archer, Florida, on the 3d, 4th, 21st and 24th.

The following instances of damage to vegetation by frost have been reported:

Cleburne, Johnson county, Texas.—A heavy frost occurred on the 1st, causing serious injury to the oat crop.

Wilmington, North Carolina.—A heavy frost occurred on the 29th, damaging the fruit trees and early vegetation.

Milledgeville, Baldwin county, Georgia.—Vegetation in this part of the state was much retarded and seriously injured by the cold weather during the last half of the month, which was characterized by sudden changes of temperature.

ICE.

Under the heading "ice in rivers and harbors" in this REVIEW the subject of ice formation in the northern sections of the country is considered. In the Southern states the following instances of ice formation have been reported:

Alabama.—Auburn, 15th, 20th, 28th, 29th; Green Springs, 28th, 29th.

Arizona.—Fort Grant, 13th, 14th.

California.—Red Bluff, 8th, 11th, 13th; Sacramento, 6th, 7th, 8th to 14th; Salinas City, 13th.

Florida.—Jacksonville, ice formed one and one-half inches in thickness on the 29th; Pensacola, 29th.

Georgia.—Atlanta, 28th.

North Carolina.—Brevard, 16th, 20th, 21st, 22d, 24th to 29th; New River Inlet, 24th, 29th.

Texas.—El Paso, 28th; Galveston, 14th; Indianola, 14th, 15th.

PRECIPITATION.

[Expressed in inches and hundredths.]

The precipitation for February, 1884, in the north Pacific coast region was 4.22 below the average. Slight deficiencies—ranging from 0.17 to 0.64—occurred in the Florida peninsula, west Gulf states, and southern slope. In the Rio Grande valley, where the February average for several years is 0.98, no rain fell during the month, except an inappreciable amount at Brownsville, Texas. In the south Atlantic states and middle slope the monthly precipitation was about the average. In all other districts it was above the average. Large excesses occurred in southern California, New England, the middle

Atlantic states, Ohio valley, and Tennessee. At Los Angeles, California, the monthly precipitation was 13.37, or nearly four times as great as the February average of the last twelve years. In the middle Atlantic states, New England, and the Ohio valley the excesses over the average were large and singularly uniform, being 2.59, 2.61, and 2.63 respectively; in Tennessee the excess amounted to 3.64. In the other districts where the precipitation was excessive the departures were less than 1.00, except in the lower lake region, where it was 1.30.

The general distribution of rainfall for the month of February and the districts of maximum departures from the normal in each year from 1873 to 1883, inclusive, are as follows:

Districts.	Maximum departures.	Year.	Distribution.
		1873...	Deficient in the lake region, northwest, Gulf states, southern parts of Georgia and South Carolina, New York, northern Ohio, and northern New England; excessive in the northern parts of Alabama, Georgia, and South Carolina, in Tennessee, southern parts of Indiana and Ohio, Pennsylvania and southern New Jersey, Rhode Island and eastern Massachusetts and Connecticut.
		1874...	Normal in the middle Atlantic states and Minnesota; deficient in the upper Mississippi valley, upper lake region, New England, and eastern Gulf states; excessive in the Missouri, Ohio and Saint Lawrence valleys, the south Atlantic and western Gulf states, and Tennessee.
Eastern Gulf states.....	+ 2.00	1875...	Normal in the upper lake region; deficient in the lower lake region, Ohio and Saint Lawrence valleys, and on the Pacific coast; excessive in Minnesota, the upper Mississippi and Missouri valleys, Tennessee, Gulf states, and in the districts on the Atlantic coast.
Western Gulf states.....	+ 1.85		
South Atlantic states.....	+ 1.20		
Pacific coast.....	+ 2.08		
Ohio valley.....	+ 1.85		
Saint Lawrence valley.....	+ 1.01		
Lower lake region.....	+ 2.30	1876...	Normal in Minnesota and the lower Missouri valley; excessive in the lake region, upper Mississippi and Saint Lawrence valleys, New England, the middle Atlantic and western Gulf states; deficient in the Ohio valley, Tennessee, and in the south Atlantic and eastern Gulf states.
Saint Lawrence valley.....	+ 1.60		
Western Gulf states.....	+ 1.60		
Ohio valley and Tennessee.....	+ 1.00		
Eastern Gulf states.....	+ 0.85		
Portland, Oregon.....	+ 0.66	1877...	Slight excess at Portland, Oregon; deficient in California and east of the Rocky mountains, the departures exceeding 1.00 in all districts, excepting the Missouri valley, Minnesota, south Atlantic and western Gulf states.
Tennessee and Ohio valley.....	+ 2.90		
Eastern Gulf states.....	+ 2.50		
Lower lake region.....	+ 2.35		
Saint Lawrence valley.....	+ 2.25		
New England.....	+ 2.10		
California coast.....	+ 6.12	1878...	Normal in the upper lake region and in the upper Mississippi and lower Missouri valleys; very large excess on the Pacific coast, and slight excess in the lower lakes and New England; deficient in Tennessee, the Ohio and Saint Lawrence valleys, Gulf states, and on the Atlantic coast south of New England.
Portland, Oregon.....	+ 5.27		
Tennessee.....	+ 2.18		
Ohio valley.....	+ 1.50		
Saint Lawrence valley.....	+ 1.33		
Middle Atlantic states.....	+ 1.25		
Portland, Oregon.....	+ 5.62	1879...	Excessive on the Pacific coast, in Minnesota, and the upper lake region; deficient in all other districts, the departures being very slight in the lower lake region, New England, and south Atlantic states.
Upper lake region.....	+ 0.45		
California coast.....	+ 0.42		
Western Gulf states.....	+ 1.00		
Middle Atlantic states.....	+ 1.30		
Ohio valley.....	+ 1.20		
Tennessee.....	+ 4.54	1880...	Normal in Minnesota; excessive in the lake region, upper Mississippi, Ohio, and Saint Lawrence valleys, New England, Florida, Tennessee, and the western Gulf states; deficient on the Pacific coast, in the lower Missouri valley, middle and south Atlantic and Gulf states.
Saint Lawrence valley.....	+ 2.47		
Ohio valley.....	+ 1.55		
Portland, Oregon.....	+ 2.51		
California coast.....	+ 1.77		
Portland, Oregon.....	+ 4.43	1881...	Deficient in California, the upper Missouri valley, south Atlantic states and Florida; excessive in all other districts.
Upper lake region.....	+ 3.09		
Lower Missouri valley.....	+ 2.83		
Eastern Gulf states.....	+ 2.83		
South Pacific coast region.....	+ 1.87		
Upper Missouri valley.....	+ 1.58		
Ohio valley.....	+ 3.74	1882...	Deficient in Florida, the Rio Grande valley, and over the region between the ninety-second meridian and the Pacific coast north of the thirty-fifth parallel; excessive in all other districts.
Tennessee.....	+ 3.16		
Eastern Gulf states.....	+ 1.95		
Florida.....	+ 2.09		
Middle Pacific coast region.....	+ 1.98		
South Atlantic states.....	+ 0.57		
Ohio valley.....	+ 3.86	1883...	Normal in the middle slope; deficient on the Pacific coast, in the northern and middle plateau districts, extreme northwest, and in the south Atlantic and Gulf states; excessive in all other districts.
Lower lake region.....	+ 1.74		
Middle Atlantic states.....	+ 1.38		
North Pacific coast region.....	+ 5.40		
Middle Pacific coast region.....	+ 3.80		
Florida peninsula.....	+ 2.21		

Table of excessive, and greatest and least monthly precipitation.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration	Amount.	Station.	Amt.
Alabama.						
Green Springs.....	12	2.59		6.48	Colorado.	
Montgomery.....	16, 17	2.73			West Las Animas.....	0.50
Mount Vernon Barracks.....	16	2.44			Dakota.	
Mobile.....	13, 14	2.21			Fort Buford.....	0.12
Do.....	16, 17	2.05			Fort Meade.....	0.33
Arizona.						
Prescott.....	3, 4	2.05		6.55	Fort Randall.....	0.33
Do.....	5, 6	1.79			Fort Yates.....	0.33
Arkansas.						
Lead Hill.....	10, 11, 12	8.31		10.93	Fort Sully.....	0.47
Fort Smith.....	10, 11, 12	8.54		10.72	Kansas.	
Springfield.....	5, 6	4.52		10.15	Salina.....	0.05
Do.....	10, 11, 12	3.47			Dodge City.....	0.21
Mount Ida.....	5, 6, 7	5.00		9.80	Atchison.....	0.37
Little Rock.....	6, 7, 8	4.94		9.79	Hector.....	0.37
Fayetteville.....				8.05	Saint Vincent.....	0.24
California.						
Newhall.....				14.53	Montana.	
Los Angeles.....	1, 2	4.45		13.37	Fort Benton.....	0.35
Do.....	15, 16, 17	5.58			Fort Assinaboine.....	0.37
Summit.....				12.70	Fort Keogh.....	0.33
Cieco.....				12.00	Nebraska.	
Colton.....				11.38	Pera.....	0.21
Truckee.....				11.20	Hastings.....	0.23
San Fernando.....				10.60	North Platte.....	0.23
Emigrant Gap.....				10.20	Stockholm.....	0.24
Colfax.....				9.73	Dawson.....	0.25
Ravenna.....				9.50	Central City.....	0.29
Spadra.....				8.80	Ashland.....	0.30
Alta.....				8.60	Inavale.....	0.34
Knoxville.....				8.08	Fort Niobrara.....	0.38
Mojave.....				7.67	Keene.....	0.39
Auburn.....				7.63	Falls City.....	0.41
Keene.....				7.40	Crete.....	0.43
Tehachapi.....				7.26	Table Rock.....	0.45
White Water.....				6.96	Fort Robinson.....	0.50
Angel Island.....				6.85	Syracuse.....	0.50
San Francisco.....				6.65	Nevada.	
Gilroy.....				6.65	Wadsworth.....	0.50
Pajaro.....				6.33	New Mexico.	
Boca.....				6.30	Fort Craig.....	0.04
Niles.....				6.18	Fort Wingate.....	0.50
Pleasanton.....				6.18	Texas.	
Ione.....				6.13	Rio Grande City.....	0.00
Sacramento.....	15, 16, 17	3.03			Fort Davis.....	0.00
Fort Gaston.....	19, 20	2.15			Brownsville.....	0.00
Connecticut.						
Voluntown.....				6.30	Indianola.....	0.04
Delaware.						
Delaware Breakwater.....				6.14	El Paso.....	0.20
District of Columbia.						
Distributing Reservoir.....				7.19	Fort Elliott.....	0.27
Washington City.....				6.84	Fort Concho.....	0.48
West Washington.....				6.15	Wyoming.	
Georgia.						
Atlanta.....	16, 17	2.41			Cheyenne.....	0.26
Milledgeville.....	1	2.00	2 hours		Fort Bridger.....	0.48
Florida.						
Mayport.....	16, 17	2.79				
Sanford.....	16	2.50				
Fort Barrancas.....	16, 17	2.08				
Illinois.						
Greenfield.....				8.90		
Mascoutah.....				6.70		
Golconda.....				6.61		
Swanwick.....				6.18		
Cairo.....	5, 6	2.41				
Indiana.						
Marengo.....				10.80		
Vevay.....	6	3.50		10.23		
Laconia.....	5, 6, 7	4.11		9.19		
Jeffersonville.....	5, 6, 7	3.98		8.81		
Salem.....				7.75		
Sumner.....	4, 5	2.00		7.45		
Hanover.....				7.45		
Huntingburg.....				6.88		
Blue Lick.....				6.83		
Princeton.....				6.70		
Degonia.....				6.59		
Martinsville.....				6.46		
Evansville.....				6.35		
Kentucky.						
Louisville.....	5, 6	4.11		9.84		
Frankfort.....				8.56		
Bowling Green.....	6	2.73		6.89		
Louisiana.						
Shreveport.....	7, 8	3.14				
Maine.						
Eastport.....	23	3.06		9.38		
Gardiner.....				7.29		
Cornish.....				7.38		
Portland.....				6.92		
Orono.....				6.85		
Maryland.						
Fallston.....				7.01		
Receiving Reservoir (near Washington City).				6.82		
Baltimore.....				6.69		
Woodstock.....				6.69		
Ocean City.....				6.40		
McDonough.....				6.04		
Massachusetts.						
Princeton.....				7.44		
Provincetown.....				7.34		
Westborough.....				7.12		
Charlestown.....				6.35		

Table of excessive, and greatest and least monthly precipitation.—Continued.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration.	Amount.	Station.	Amt.
Massachusetts—Continued.						
Worcester				6.23		
Fall River				6.15		
Mississippi.						
Vicksburg	6, 7	2.31		6.73		
Missouri.						
Centerville				6.21		
Pierce City	11, 10	2.50				
Lebanon	9, 10	2.25				
Nebraska.						
Clear Creek	3, 4	3.53				
New Brunswick.						
Saint Andrews				6.23		
New Hampshire.						
Mount Washington				7.55		
New Jersey.						
Atlantic City				7.44		
Vineland				6.78		
Caldwell				6.51		
Cape May				6.22		
Little Egg Harbor				6.08		
New York.						
Fort Hamilton				6.06		
North Carolina.						
Highlands	13	2.00		10.10		
Do.	16, 17	2.35				
Brevard	16, 17	3.00		10.07		
Charlotte	19	2.10		6.43		
Statesville	19, 20	2.15		6.06		
Lenoir	13, 14	2.10				
Nova Scotia.						
Yarmouth				7.70		
Halifax				6.17		
Ohio.						
Cincinnati	4, 5, 6	4.56		8.87		
Quaker City				8.19		
Jacksonburg				7.65		
Canal Dover	4, 5, 6	2.59		7.57		
Logan	6	2.37		7.52		
Lebanon				6.78		
Waverly				6.05		
Washington	7	3.74		6.43		
Portsmouth				6.11		
Oregon.						
Albany	18, 19	4.90		8.90		
Astoria				7.13		
Pennsylvania.						
Millville Depot				7.40		
West Chester				7.29		
Rhode Island.						
Block Island				7.31		
Tennessee.						
Ridgelyton	13	2.15		11.32		
Careyville				10.66		
Maryville	8	2.86		10.43		
Do.	13	2.23				
Flat Creek				9.91		
Beech Grove				9.65		
Memphis	5 to 10	6.19		9.64		
Manchester				9.24		
Andersonville				9.18		
Grassy Cove				9.18		
Parksville				8.97		
Savannah				8.94		
Chattanooga	7, 8	4.40		8.81		
Smithville (near)	7	2.00		8.80		
Dyersburg	0	3.24		8.69		
Grief	7	3.00		8.57		
Do.	9	2.12				
Franklin				8.51		
Knoxville	7, 8, 9	4.28		8.51		
Alexandria				8.47		
Florence Station				8.40		
Austin				8.27		
Nashville				8.18		
Huntingdon				8.14		
Gadsden	6	2.30		8.11		
Waverly				8.10		
Milan				7.96		
Pulaski				7.83		
Hurricane Switch				7.70		
Bolivar	7	2.02		7.46		
Jonesborough				7.43		
Ashwood				7.30		
Sailor's Rest				7.22		
Fostoria	9	2.40		6.90		
McKenzie				6.82		
Hardison's Mills	7	2.16		6.63		
Texas.						
Clarksville	12	4.02		10.38		
New Uim	12	2.06				
Virginia.						
Lynchburg	14, 15	3.77		9.02		
Variety Mills				7.12		
Johnsontown				6.55		
Washington Territory.						
Neah Bay	23	3.00		8.00		
Pysht	19	2.25		7.98		
Bainbridge Island	22	2.80				

In the first column of the following table is shown the average precipitation for February in each of the various districts for several years, as determined from observations made at the Signal Service stations; in the second column are given the averages for February, 1884, and the third column shows the excess or deficiency of February, 1884, as compared with the average:

Average precipitation for February, 1884.

Districts.	Average for February. Signal-Service observa- tions.		Comparison of Feb., 1884, with the average for several years.
	For several years.	For 1884.	
	Inches.	Inches	Inches.
New England.....	3.84	6.47	2.63 excess.
Middle Atlantic states.....	3.21	5.80	2.59 excess.
South Atlantic states.....	4.00	4.09	0.09 excess.
Florida peninsula.....	2.54	1.90	0.64 deficiency.
Eastern Gulf states.....	5.11	5.40	0.29 excess.
Western Gulf states.....	4.16	3.79	0.37 deficiency.
Rio Grande valley.....	0.98	0.00	0.98 deficiency.
Tennessee.....	5.14	8.78	3.64 excess.
Ohio valley.....	3.81	6.42	2.61 excess.
Lower lake region.....	2.37	3.67	1.30 excess.
Upper lake region.....	1.81	2.71	0.90 excess.
Extreme northwest.....	0.66	1.05	0.39 excess.
Upper Mississippi valley.....	2.50	2.66	0.16 excess.
Missouri valley.....	0.90	1.30	0.40 excess.
Northern slope.....	0.44	0.68	0.24 excess.
Middle slope.....	0.42	0.47	0.05 excess.
Southern slope.....	0.62	0.45	0.17 deficiency.
Southern plateau.....	0.84	3.58	2.74 excess.
Northern plateau.....	2.35	3.36	1.01 excess.
North Pacific coast region.....	8.47	4.25	4.22 deficiency.
Middle Pacific coast region.....	4.13	4.44	0.31 excess.
South Pacific coast region.....	2.06	7.48	5.42 excess.
Mount Washington, N. H.....	3.87	7.55	3.68 excess.
Pike's Peak, Colo.....	1.33	0.76	0.57 deficiency.
Salt Lake City, Utah.....	1.25	2.23	0.98 excess.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal Service stations, are shown in the table of average precipitation for February, 1884. Voluntary observers report the following notes in connection with this subject:

Arkansas.—Lead Hill, Boone county: monthly precipitation, 10.93, is 3.25 above the February average of the two preceding years.

Illinois.—Mattoon, Coles county: monthly precipitation, 5.44, is 1.11 below the February average of the last five years.

Riley, McHenry county: monthly precipitation, 2.20, is 0.57 above the February average of the last twenty-one years. The precipitation for the winter season of 1883-4 is 4.67, or 0.77 below the winter average of the last twenty years.

Anna, Union county: monthly precipitation, 5.10, is 0.99 above the February average of the last nine years.

Indiana.—Laconia, Harrison county: monthly precipitation, 9.19, is the largest occurring in February during the last eighteen years.

Wabash, Wabash county: monthly precipitation, 4.48, is 0.83 above the February average of the last eight years.

Kansas.—Fort Scott, Bourbon county: monthly precipitation, 2.53, is 0.86 below the February average of the last four years.

Independence, Montgomery county: monthly precipitation, 2.25, is 0.15 below the February average of the last twelve years.

Wellington, Sumner county: monthly precipitation, 0.71, is 0.61 below the February average of the last five years.

Lawrence, Douglas county: monthly precipitation, 1.13, is 0.20 below the February average of the last seventeen years.

Maine.—Gardiner, Kennebec county: monthly precipitation, 7.29, is 3.88 above the February average of the last forty-eight years, and is, with the exception of 9.47 in 1853, the largest February precipitation of that period.

Maryland.—Fallston, Harford county: monthly precipitation, 7.01, is 3.44 above the February average of the last fifteen years.

Massachusetts.—Worcester, Worcester county: monthly precipitation, 6.24, is 3.17 above the February average of the last forty-five years. The largest February precipitation of that

period, 8.09, occurred in 1853; the smallest, 0.76, occurred in 1877.

New Jersey.—South Orange, Essex county: monthly precipitation, 4.85, is 0.97 above the February average of the last fourteen years. The precipitation for the winter season of 1883-4 is 14.91, or 4.82 above the winter average of the last fourteen years.

New York.—Palermo, Oswego county: monthly precipitation, 3.60, is 1.40 above the February average of the last thirty-one years.

North Volney, Oswego county: monthly precipitation, 3.25, is 0.48 above the average of the last twelve years. The total precipitation for the winter season of 1883-4, is 9.80, or 0.49 above the average of the last twelve years.

Ohio.—Wauseon, Fulton county: monthly precipitation, 5.02, is 2.12 above the average of the last ten years. The largest February precipitation of that period, 6.81, occurred in 1876; the smallest, 0.12, occurred in 1877.

Texas.—New Ulm, Austin county: monthly precipitation, 2.58, is 2.72 below the February average of the last twelve years. The largest February precipitation of that period, 10.94, occurred in 1882; the smallest, 1.13, occurred in 1879.

Virginia.—Variety Mills, Nelson county: monthly precipitation, 7.12, is 4.30 above the February average of the last five years, and is the largest occurring during that period.

Wytheville, Wythe county: monthly precipitation, 5.33, is 1.93 above the February average of the last twenty years, and has been exceeded but twice during that period.

West Virginia.—Helvetia, Randolph county: monthly precipitation, 5.24, is 0.77 above the February average of the last eight years.

Table of rainy and cloudy days, relative humidity, and dew-point for Feb., 1884.

Districts.	† Rainy days.	‡ Cloudy days.	Rel. humidity, °		Dew-point.
			Percentages.		°
			From 75.7 to 86.3	From 19.5 to 31.2	
New England.....	From 18 to 22	From 9 to 18	66.4 " 87.6	23.1 " 42.5	
Middle Atlantic states.....	" 14 " 23	" 6 " 19	63.0 " 84.2	37.5 " 52.9	
South Atlantic states.....	" 10 " 16	" 2 " 12	75.0 " 79.7	56.3 " 64.1	
Florida peninsula.....	" 11 " 13	" 3 " 5	66.5 " 77.4	43.8 " 50.5	
East Gulf states.....	" 10 " 16	" 6 " 10	68.5 " 80.2	32.8 " 53.3	
West Gulf states.....	" 8 " 14	" 6 " 14	61.9 " 71.1	50.4 " 56.4	
Rio Grande valley.....	" 0 " 1	" 3 " 6	73.1 " 78.0	36.9 " 34.9	
Ohio valley.....	" 17 " 25	" 11 " 16	72.0 " 77.1	37.9 " 39.2	
Tennessee.....	" 19 " 27	" 13 " 16	74.1 " 84.8	21.3 " 25.7	
Lower lake region.....	" 21 " 26	" 13 " 27	69.5 " 82.5	0.3 " 19.9	
Upper lake region.....	" 18 " 27	" 9 " 22	77.5 " 87.4	-13.8 " -3.5	
Extreme northwest.....	" 13 " 25	" 4 " 9	64.8 " 78.3	4.5 " 34.4	
Upper Mississippi valley.....	" 16 " 22	" 8 " 15	64.9 " 81.1	-1.1 " 17.2	
Missouri valley.....	" 11 " 20	" 8 " 12	50.3 " 84.3	-5.8 " 11.8	
Northern slope.....	" 9 " 18	" 3 " 15	57.2 " 80.7	-2.2 " 22.5	
Middle slope.....	" 3 " 19	" 2 " 8	49.4 " 70.7	30.2 " 35.0	
Southern slope.....	" 0 " 10	" 6 " 11	46.8 " 79.1	27.9 " 36.9	
Southern plateau.....	" 6 " 14	" 2 " 11	74.0 " 79.4	15.5 " 24.6	
Northern plateau.....	" 5 " 14	" 10 " 12	78.7 " 84.0	28.5 " 33.2	
North Pacific coast region.....	" 12 " 17	" 6 " 12	70.8 " 78.0	35.4 " 42.5	
Middle Pacific coast region.....	" 8 " 10	" 4 " 9	54.9 " 71.1	38.4 " 44.2	
South Pacific coast region.....	" 6 " 15	" 5 " 10	87.9	10.9	
Mt. Washington, N. H.....	Twenty-three	Three	80.7	-2.2	
Pike's Peak, Colo.....	Nineteen	Four	57.2 *	17.9	
Salt Lake City, Utah.....	Eleven	Eight			

* Relative humidity corrected for altitude. † Including all days on which rain or snow fell. ‡ Including all cloudy days—with or without snow.

SNOW.

The dates on which snow is reported to have fallen in the various districts are as follows:

New England.—1st to 6th, 8th to 15th, 17th to 29th.

Middle Atlantic states.—1st to 5th, 9th to 12th, 15th, 19th to 29th.

Western Gulf states.—13th to 16th, 19th, 27th, 29th.

Tennessee.—3d, 4th, 6th, 14th, 23d, 24th, 26th, 27th, 28th.

Ohio valley.—1st, 2d, 10th, 13th, 14th, 15th, 19th, 20th, 23d to 29th.

Lower lake region.—1st to 15th, 19th to 29th.

Upper lake region.—1st to 29th.

Extreme northwest.—1st to 13th, 15th to 29th.

Upper Mississippi valley.—1st to 14th, 16th to 29th.

Missouri valley.—2d to 8th, 10th to 19th, 22d to 29th.

Northern slope.—1st to 29th.

Middle slope.—3d to 8th, 10th to 13th, 15th to 19th, 21st to 29th.

Southern plateau.—3d, 4th, 6th, 7th, 11th, 12th, 15th to 18th.

Middle plateau.—1st to 12th, 15th to 20th, 26th.

Northern plateau.—2d to 10th, 14th to 22d, 29th.

North Pacific coast region.—3d to 10th, 14th to 20th.

Middle Pacific coast region.—4th, 6th, 7th, 10th, 14th, 15th, 18th.

Snow also fell at the following stations not included in the districts named above:

Auburn, Alabama, 13th, 19th; Fort Concho, Texas, 12th, 13th.

Snow storms of unusual severity, impeding railroad travel, etc., have been reported as follows:

Truckee, California.—The heavy snow-fall of the 5th blockaded the Central Pacific railroad near Boca.

Durango, La Plata county, Colorado.—This place was entirely cut off from communication with other points by snow-blockades from the 5th to the 18th. On the latter date the snow was two and one-half feet deep on the level. In the canyon above Elk Falls, for a distance of four miles, the snow averaged fifty-feet deep, and at Barker's Park it was reported to have been six feet deep on the level.

Saint Paul, Minnesota.—The snow storm of the 11th and 12th caused great inconvenience throughout the northwest. The fall of snow was comparatively light, but the high winds caused it to drift badly. The greatest inconvenience resulting from the storm was experienced in the southern parts of Dakota and Minnesota and in northern Nebraska.

Salt Lake City, Utah.—The Oregon Short Line railroad was blockaded with snow from the 10th to 28th. On the 11th the heaviest snow-fall of the season occurred, about ten inches having fallen. Nearly all trains were delayed, and business in the city was almost entirely suspended. On the 18th a snow-slide occurred at Park City (three miles southeast of Salt Lake City), a small mining camp, which resulted in the death of three persons.

Buffalo, New York.—The snow storm of the 28th seriously impeded travel in this vicinity.

Saratoga, New York.—Great inconvenience was experienced on the railroads in consequence of the snow storm of the 28th. The snow-drifts along the line of the Delaware and Hudson road averaged from ten to twenty feet deep.

Oswego, New York.—The heavy snow storm on the 28th caused temporary suspension of travel on the railroads in this vicinity.

New York City.—A heavy snow storm prevailed on the 28th, causing considerable damage to trees and telegraph lines.

Concord, New Hampshire.—The snow storm on the 28th was one of the severest of the season. The snow fell to an average depth of eighteen inches, and the high winds caused it to drift badly. All trains were delayed in consequence.

Boston, Massachusetts.—On the 28th a heavy snow storm prevailed, which caused great damage to the telegraph and telephone lines.

New Haven, Connecticut.—Great damage was done to the telephone and telegraph lines in this vicinity by the heavy snow storm of the 28th.

Bangor, Maine.—Railroad travel was impeded and telegraph lines prostrated by the snow-storm on the 28th.

Portland, Maine.—Telegraphic communication was seriously interrupted by the severe snow-storm on the 28th.

The following instances of snow fall in localities where snow is of uncommon occurrence have been reported:

Marysville, Yuba county, California.—A peculiar snow storm occurred on the afternoon of the 6th. The weather during the earlier part of the day had been fine, but at 4 p. m. the sky became suddenly obscured by a black cloud and soon afterwards snow began to fall. It continued for more than one hour, covering the streets and housetops to a depth of more than one inch.

Sacramento, California.—At 11 p. m. of the 14th a few flakes of snow fell.

SNOW FROM A CLOUDLESS SKY.

Yates Centre, Woodson county, Kansas.—Snow fell from a cloudless sky from 9.30 to 9.45 a. m. of the 9th.

LARGEST MONTHLY SNOW-FALLS.

[Expressed in inches and tenths.]

The following are the largest monthly snow-falls reported from the various states and territories during the month:

California.—Cisco, 120; Summit, 120; Truckee, 112; Emigrant Gap, 102; Boca, 63; Alta, 31; Tehachapi, 28; Keene, 27; Mojave, 22; Colfax, 15; Ravenna, 7.

Colorado.—Denver, 8.6; Pike's Peak, 7.6; Pueblo, 7.2.

Connecticut.—New Haven, about 17; Southington, 16.5; Bethel, 14.

Dakota.—Webster, 18; Yankton, 18; Alexandria, 10.4; Deadwood, about 10; Rapid City, 9.3; Richardton, 9; Bismarck, 8.7; Fort Sisseton, 8.2; Fort Pembina, 8; Huron, 5.8; Fort Bennett, 5.7; Vermillion, 5.

Idaho.—Fort Lapwai, 30; Lewiston, 26.5; Boise City, about 8.

Illinois.—Marengo, 8.8; Polo, 8.8; Riley, 8.8; Sycamore, 8.5; Chicago, 7.8; Aurora, 7.7; Rockford, 7.6; Prairieville, 7.5; Sandwich, 6.5.

Indiana.—Lafayette, 8.6; Logansport, 6.2; Griffin Station, 5.2.

Iowa.—Guttenburg, 18; Des Moines, about 17; Dubuque, about 17; Independence, 17; Indianola, 14.8; Logan, 12; Humboldt, 11.9; Cresco, 11.5; Monticello, 8.7; Cedar Rapids, 8.5; Muscatine, 7.

Kansas.—Allison, 5.

Maine.—Portland, about 40; Gardiner, 32; Cornish, 27; Orono, 26.5; Eastport, about 22.

Massachusetts.—Worcester, 32.2; Princeton, 23.8; Westborough, 22; Rowe, 18; Charlestown, 17.4; Boston, 15.1; Mendon, 14; Milton, 10; Amherst, 9.5; Fall River, 9.5; Somerset, 9.5.

Michigan.—Manistique, 40.3; Northport, 36.6; Traverse City, 26.2; Escanaba, about 24; Alpena, 23.3; Marquette, 20; Kalamazoo, 17; Ionia, 15.2; Detroit, about 15; Grand Haven, about 14; Thornville, 12; Lansing, 10.2; Mottville, 10; Swartz Creek, 6.2; Hudson, 6; Hillsdale, 5.

Minnesota.—Chester, 32; Duluth, 27; Minneapolis, 22; Northfield, 18; Fort Snelling, 13.4; Moorhead, 13.2; Saint Paul, 12.7.

Missouri.—Pierce City, 5.5.

Montana.—Fort Custer, about 13; Helena, 12.5; Fort Shaw, 8.2; Fort Ellis, 7.5; Fort Maginnis, 6.9.

Nebraska.—Genoa, 11; Johnson, 10.1; Omaha, about 9; De Soto, 7.5; Peru, 7.5; Red Willow, 7; Fremont, 6.2.

Nevada.—Fort McDermitt, 48; Battle Mountain, 23; Carson City, 22.9; Beowawe, 16; Reno, 12; Carlin, 11; Elko, 10; Palisade, 10; Winnemucca, 10; Otego, 8.5; Tecoma, 8.5; Golconda, 7.8; Toano, 7.8; Humboldt, 7.5; Halleck, 7.2; Wells, 7; Browns, 6.2; Wadsworth, 5.

New Hampshire.—Wolfborough, about 29; Ashland, about 24; Bristol, 24; Mount Washington, about 20.

New Jersey.—Caldwell, 11.5; Paterson, 10.5; South Orange, 9; Somerville, 8.5; Newark, 5.5.

New York.—Buffalo, about 15; Oswego, about 15; Humphrey, 14.5; Mountainville, 11.7; White Plains, 11; Flushing, 9.5; Menand Station (near Albany), 9.3; Albany, about 9; Rochester, 6.9; Factoryville, 5.8; Palermo, 5.2; Ithaca, 5; Penn Yan, 5.

Ohio.—Cleveland, 10.1; Garrettsville, 7.8; Hiram, 6; Wauseon, 5.6; Jacksonburg, 5.

Oregon.—Eola, 32; Albany, 28; Portland, 23.5; Linkville, 23; Lake View, 22.4; Astoria, 8.6.

Pennsylvania.—Erie, about 17; Dyberry, 10; Easton, 9; Grampian Hills, 9; Drifton, 8.2; Millville Depot, 7.6; Wellsborough, 7.5; Troy, 6.2; Wilkesbarre, 5.3; Catawissa, 5.2; Germantown, 5.

Tennessee.—Ashwood, 7; Austin, 6.5.

Utah.—Salt Lake City, 22.1; Nephi, 21.5; Promontory, 16.5;

Logan, 14; Corinne, 13; Ogden, 13; Terrace, 9; Kelton, 7.2; Blue Creek, 4.5.

Vermont.—Strafford, 20; Newport, 19.3; Lunenburg, 18; Woodstock, 15.2; Dorset, 13.5; Burlington, 8.5.

Virginia.—Lynchburg, 24.

Washington Territory.—Bainbridge Island, 33.2; Spokane Falls, about 29.

West Virginia.—Helvetia, 6.5.

Wisconsin.—Neillsville, 33.8; Embarrass, 30.7; Wausau, 25.2; Franklin, 25; Milwaukee, about 20; Madison, 16; Sussex, 15.2; Lancaster, 14.5; La Crosse, 14.2; Ripon, 13.8; Manitowoc, 11; Beloit, 9.2; Evansville, 6.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[Expressed in inches and tenths.]

Arkansas.—Lead Hill, trace.

Colorado.—Pike's Peak, 30; Golden, 7.2; Denver, 4.

Connecticut.—Southington, 10; Bethel, 6; New Haven, 5; New London, 2.2.

Dakota.—Webster, 19.7; Deadwood, 8; Fort Buford, about 5; Bismarck, 4; Rapid City, about 4; Huron, 4; Alexandria, 2; Fort Bennett, trace.

Illinois.—Polo, 18; Prairieville, 12; Riley, 0 to 12; Marenco, 0 to 12; Sycamore, 7; Sandwich, 6; Mascoutah, 3.5; Aurora, 2; Chicago, 2; Golconda, 2; Monmouth, 1; Cairo, trace; Swanwick, trace; Palestine, trace.

Indiana.—Vevay, 2; Jeffersonville, 1.8; Laconia, 1.5; Lafayette, 1.5; Fort Wayne, 1; Griffin Station, 1; Indianapolis, 1; Sunman, 1; Logansport, 0.5.

Iowa.—Independence, 18 to 24 in the woods; Manchester, 17; Cresco, 15; Monticello, 14; Humboldt, 6.4; Cedar Rapids, about 6; Dubuque, 5; Des Moines, 2 to 5; Muscatine, 2.5; Ottumwa, 2.1; Indianola, 2; Logan, 2; Davenport, 0 to 0.7; Keokuk, trace.

Kansas.—Leavenworth, trace.

Kentucky.—Frankfort, 0.9; Louisville, trace.

Maine.—Gardiner, 30; Portland, 28; Orono, 14; Eastport, 7.

Massachusetts.—Rowe, 33; Worcester, 26.2; Westborough, 22; Princeton, 20; Mendon, 14; Charlestown, 6; Milton, 5; Fall River, 4; Somerset, 4; Taunton, 4; Boston, 3; Provincetown, 1.

Michigan.—Manistique, 38; Northport, 37; Marquette, 26; Traverse City, 20; Grand Haven, 12; Alpena, 11; Ionia, 9; Thornville, 8; Hudson, 5; Port Huron, 5; Escanaba, 4; Mackinaw City, 4; Swartz Creek, about 4; Hillsdale, 3; Detroit, 1.

Minnesota.—Chester, about 36; Minneapolis, 24; Moorhead, 18; Saint Paul, 11.5; Saint Vincent, 5.

Missouri.—Curryville, 2.

Montana.—Fort Custer, 3; Fort Maginnis, 2.5; Fort Assinaboine, 1.5.

Nebraska.—De Soto, 0.5; Fremont, trace; Marquette, trace.

Nevada.—Carson City, in drifts.

New Hampshire.—Bristol, 48; Mount Washington, 15.

New Jersey.—Caldwell, 6; Paterson, 6; Somerville, 5; South Orange, 4; Newark, 3.

New York.—North Volney, about 14 in the woods; Palermo, 12; Cooperstown, 6; Humphrey, 6; Mountainville, 5; Buffalo, 4; Menand Station (near Albany), 4; White Plains, 4; Flushing, 3; Oswego, 3; Albany, 2; Penn Yan, 2; Rochester, 2; Ithaca, 1; New York City, 1.

Ohio.—Cleveland, 5; Garrettsville, 4; Hiram, 4; Jacksonburg, 4; Ruggles, 3; North Lewisburg, 2; Portsmouth, 2; Wauseon, 2; College Hill, 1.2; Sandusky, 1; Westerville, 1; Toledo, 0.5; Canal Dover, trace; Cincinnati, trace; Columbus, trace.

Oregon.—Albany, in drifts.

Pennsylvania.—Dyberry, about 12; Grampian Hills, 5; Drifton, 4; Wilkesbarre, 2.5; Erie, 2; Haverford College, 2; West Chester, 1.5; Catawissa, 1; Leetsdale, 1; Pittsburg, 1; Troy, 1; Millville Depot, 0.5; Wellsboro, trace.

Rhode Island.—Block Island, trace.

Tennessee.—Ashwood, 5; Austin, 4; Nashville, 1.7; Knoxville, 0.5; Milan, trace.

Utah.—Logan, 3; Nephi, 1 to 3.

Vermont.—Strafford, 24; Woodstock, 17; Dorset, 6; Burlington, 4.

Virginia.—Wytheville, 2.5; Marion, trace.

Washington Territory.—Spokane Falls, 10.

West Virginia.—Helvetia, 4.

Wisconsin.—Embarrass, 26; Neillsville, 26; La Crosse, 20; Franklin, 18; Madison, 18; Ripon, 18; Sussex, 18; Lancaster, 12; Milwaukee, 10; Evansville, 8; Beloit, 7.

SLEET.

Sleet is reported to have fallen in the various districts on the following dates:

New England.—4th, 5th, 7th, 8th, 11th, 12th, 13th, 20th, 23d, 24th, 28th.

Middle Atlantic states.—4th, 8th, 11th, 26th.

South Atlantic states.—Highlands, North Carolina, 22d.

Western Gulf states.—12th to 15th.

Tennessee.—Memphis, 19th; Chattanooga, 27th.

Ohio valley.—8th, 10th, 19th, 26th.

Lower lake region.—3d to 8th, 11th, 12th, 13th, 22d.

Upper lake region.—4th, 5th, 6th, 10th to 14th, 19th.

Extreme northwest.—Fort Totten, Dakota, 24th.

Upper Mississippi valley.—1st, 4th, 8th, 11th, 12th, 13th, 16th, 17th, 19th, 25th, 27th.

Missouri valley.—3d, 4th, 7th, 8th, 10th, 11th, 12th, 16th, 19th, 23d, 24th, 29th.

Middle slope.—4th, 6th, 10th, 11th, 12th, 15th, 16th.

Southern slope.—Fort Stockton, Texas, 13th.

Southern plateau.—Prescott, Arizona, 6th; Willecox, Arizona, 16th.

North Pacific coast region.—Fort Canby, Washington Territory, 8th, 18th; Pysht, Washington Territory, 6th.

Middle Pacific coast region.—San Francisco, California, 6th.

HAIL.

In several instances the tornadoes, which occurred on the 19th in the southern states, were accompanied by large hail. These have been mentioned in connection with the reports given under the heading "local storms." In the several states and territories, hail storms were reported to have occurred as follows:

Alabama.—Auburn and Green Springs, 19th.

Arizona.—Prescott, 6th.

Arkansas.—Little Rock, 13th, 22d.

California.—Angel Island, 5th; Salinas City, 7th; Cape Mendocino, 4th, 6th, 10th; San Francisco, 5th.

Dakota.—Webster, 24th.

Florida.—Key West, 18th; Sanford, 13th.

Georgia.—Andersonville, Forsyth, and Augusta, 19th; Feagin and Savannah, 20th.

Illinois.—Anna and Mattoon, 19th; Cairo, 12th, 19th; Springfield, 10th.

Indian Territory.—Cantonment, 11th.

Iowa.—Guttenberg, 1st, 13th; Logan, 1st; Monticello and Oskaloosa, 4th, 12th.

Kansas.—Independence, 8th; Yates Centre, 7th, 11th.

Louisiana.—Liberty Hill, 19th.

Maine.—Bangor, 5th; Cornish, 5th, 8th, 23d; Gardiner, 5th, 9th.

Massachusetts.—Charlestown, 8th; Provincetown, 8th, 14th, 18th.

Michigan.—Detroit, 6th; Hudson, 4th, 6th, 11th, 12th.

Missouri.—Conception, 10th; Curryville, 16th; Saint Louis, 17th.

Nebraska.—Genoa, 4th.

New Hampshire.—Bristol, 9th, 12th, 13th, 16th, 17th.

New York.—Albany, 14th, 20th; Menand Station (near Albany), 20th; Syracuse, 11th.

North Carolina.—Highlands, 22d; Weldon, 15th; Statesville,

14th, 19th; New River Inlet and Wilmington, 23d; Charlotte, 1st; Scotts Hill, 19th, 22d.

Oregon.—Albany, 4th; Portland, 4th, 9th.

Tennessee.—Austin, 13th; Nashville, 13th, 19th; Knoxville and Chattanooga, 19th.

Texas.—Clarksville, 19th, 27th; Cleburne, 15th.

Utah.—Logan, 4th; Nephi, 5th, 11th, 18th, 26th.

Virginia.—Marion, 14th.

Washington Territory.—Crescent Bay, 16th.

Wisconsin.—Embarrass, 4th; Franklin, 4th, 11th.

It is probable that some of the above reports are incorrect and should have been recorded as sleet instead of hail.

WINDS.

The most frequent directions of the wind during February, 1884, at the Signal Service stations, are shown on chart iii. by arrows flying with the wind. The prevailing directions were from north to west in the upper lake region, upper Mississippi and Missouri valleys; in the Gulf states and Tennessee they were mostly from the south; in the lower lake region, Ohio valley, and on the Atlantic and Pacific coasts they were variable.

TOTAL MOVEMENTS OF THE AIR.

[In miles.]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England.....	Block Island, R. I.....	11,175	New London, Conn.....	5,585
Middle Atlantic states.....	Cape May, N. J.....	12,392	Lynchburg, Va.....	3,154
South Atlantic states.....	Fort Macon, N. C.....	10,649	Augusta, Ga.....	2,958
Florida peninsula.....	Cedar Keys.....	6,186	Sanford.....	4,530
Eastern Gulf states.....	Pensacola, Fla.....	5,800	Montgomery, Ala.....	4,408
Western Gulf states.....	Indianola, Tex.....	10,853	Little Rock, Ark.....	3,539
Ohio valley.....	Louisville, Ky.....	6,041	Cincinnati, Ohio.....	4,213
Tennessee.....	Nashville.....	5,152	Memphis.....	4,462
Lower lake region.....	Rochester, N. Y.....	9,341	Toledo, Ohio.....	5,520
Upper lake region.....	Milwaukee, Wis.....	8,536	Chicago, Ill.....	5,412
Extreme northwest.....	Fort Buford, Dak.....	7,180	Saint Vincent, Minn.....	5,119
Upper Mississippi valley.....	Saint Louis, Mo.....	8,826	Saint Paul, Minn.....	4,401
Missouri valley.....	Huron, Dak.....	7,661	Leavenworth, Kan.....	9,021
Northern slope.....	North Platte, Neb.....	10,247	Denver, Colo.....	3,933
Middle slope.....	Dodge City, Kan.....	9,001	Fort Davis, Tex.....	4,782
Southern slope.....	Fort Concho, Tex.....	7,421	El Paso, Tex.....	3,888
Southern plateau.....	Prescott, Ariz.....	5,534	Lewiston, Idaho.....	3,158
Northern plateau.....	Boisé City, Idaho.....	3,151	Olympia, Wash. T.....	940
North Pacific coast region.....	Fort Canby, Wash. T.....	7,714	San Francisco, Cal.....	1,205
Middle Pacific coast region.....	Red Bluff, Cal.....	5,376	Yuma, Ariz.....	5,074
South Pacific coast region.....	Los Angeles, Cal.....	5,483		4,780

On the summits of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the total movements of the air were 24,810 and 21,011 miles, respectively, the record at the first-named station being incomplete on account of frost work. At Salt Lake City, Utah, the total movement was 4,075 miles.

HIGH WINDS.

On the summit of Mount Washington velocities of fifty miles or more per hour occurred on the following dates: 1st to 10th, 12th to 18th, 20th to 25th, 29th. The highest velocities recorded were: 80, nw., 1st; 104, w., 5th; 100, w., 6th; 120, sw., 13th; 112, w., 14th; 130, se., 20th (maximum for the month); 82, nw., 21st; 80, sw., 22d; 116, nw., 24th; 80, nw., 29th.

On the summit of Pike's Peak velocities of fifty miles or more per hour occurred on the following dates: 1st, 2d, 3d, 9th, 10th, 14th, 15th, 17th to 23d, 25th, 27th. The highest velocities recorded were: 83, sw., 10th; 76, w., 14th; 100, w., 15th (maximum for the month); 76, w., 18th; 76, nw., 19th.

Other stations reporting wind velocities of fifty miles or more per hour are as follows:

Cape May, New Jersey, 58, nw., 20th; 52, nw., 23d; 68, w., 28th; 66, w., 29th.

Delaware Breakwater, Delaware, 68, nw., 20th; 52, nw., 23d.

Fort Canby, Washington Territory, 64, s., 19th.

Fort Macon, North Carolina, 64, sw., 28th.

Sandy Hook, New Jersey, 60, nw., 23d; 62, nw., 29th.

Cape Henry, Virginia, 60, nw., 23d.

Fort Maginnis, Montana, 56, sw., 22d.

Kitty Hawk, North Carolina, 52, sw., 20th; 56, sw., 23d.

Moorhead, Minnesota, 56, se., 24th.

Eastport, Maine, 55, e., 28th.

Barnegat City, New Jersey, 52, nw., 28th and 29th.

Buffalo, New York, 52, w., 21st.

Indianola, Texas, 52 n., 27th.

Sandusky, Ohio, 52, w., 20th.

Vicksburg, Mississippi, 52, sw., 19th.

Cheyenne, Wyoming, 50, nw., 20th.

Chincoteague, Virginia, 50, nw., 1st.

LOCAL STORMS.

On the afternoon of February 19th several of the Southern states were visited by violent tornadoes. They were most destructive in Alabama, Georgia, and the Carolinas, and appear to have moved, generally, in a direction from southwest to northeast, causing great destruction of life and property. Reports from Atlanta, Georgia, on the 22d, stated that about three hundred persons were killed, nine hundred were injured, and that \$2,000,000 worth of property had been destroyed in that state alone.

Below will be found, arranged by states, brief descriptions of the tornadoes above mentioned, as reported from the various localities in which they occurred; and also reports of other storms which were reported during February, 1884.

Alabama.—Montgomery: a storm occurred on the afternoon of the 19th, during which the wind attained a velocity of thirty-two miles per hour, blowing off the roofs of several buildings and causing other damage. The wind veered from south to northwest during the storm and the temperature fell from 80° to 47°. In surrounding localities the storm was much more severe than in the immediate vicinity of Montgomery. From Kelleyton, Coosa county, to Wetumpka, Elmore county, (northeast of Montgomery,) large hail accompanied the storm and numerous buildings were blown down. At Cross Plains, Calhoun county, eight persons were killed and several wounded. At Marion, Perry county, (northwest of Montgomery) much property was destroyed and one person killed.

At Leeds, fifteen miles east of Birmingham, a dense funnel-shaped cloud, of black appearance, was observed at about 1 p. m. approaching from the southwest. When first seen the cloud was several miles distant, advancing with great rapidity and accompanied by a heavy roaring noise. At that time the whole sky was illuminated with a peculiar glow. As it neared Leeds black shafts darted in quick succession from the cloud toward the earth. At 1.30 p. m. the tornado swept over the town, destroying everything in its path. It followed the course of the Georgia Pacific railroad for a distance of six miles, strewn the road with debris throughout its path. The scene at Leeds after the storm was one of great destruction. Houses were blown away and not even their foundations remained; horses, mules, and cattle were killed, and in some instances missiles were driven through the bodies. In Leeds and vicinity, eleven persons were killed and thirty-one were wounded, many of the latter being fatally injured; twenty-seven dwellings were entirely destroyed together with many barns and other out buildings. The tornado was accompanied by hail of unusual size. At Brook's Gap, ten miles below Birmingham, nine houses were blown down and fifteen persons injured. In the vicinity of Ladiga, Calhoun county, and Amberson's, Cherokee county, a violent storm occurred at about 3 p. m. A large number of houses were blown down and fourteen persons were reported to have been killed. Reports from Rock Run, Cherokee county, state that at 2 p. m. a tornado passed through that county, pursuing a northeasterly course and demolishing everything in its path, which was about one-half mile in width. Twenty-six persons in the immediate vicinity of Rock Run were killed and many others were injured.

Arizona.—Prescott: a severe southwesterly storm occurred on the 6th, during which the wind attained a velocity of forty-six miles per hour. Many large trees in the vicinity were prostrated.

California.—Cape Mendocino: a hurricane occurred on the

14th, during which the wind reached an estimated velocity of one hundred miles per hour.

Connecticut.—New London: a severe gale occurred on the 21st (low area ix.); many coasters put into harbor during the storm. Captains of the sound steamers reported that the storm of the 29th, (low area xiv.), was the severest of the season.

Georgia.—Columbus, Muscogee county: the damage caused in this vicinity by the storm of the 19th, is estimated at \$20,000.

Franklin, Heard county: a violent storm passed through a part of this county on the 9th, blowing down many houses and trees.

Newnan, Coweta county: a violent storm accompanied by very large hail, passed through the western part of this county on the afternoon of the 19th, its path being about one mile in width.

Palmetto, Campbell county: three severe storms occurred on the 19th, at 2, 4 and 6 p. m., respectively. The wind blew with considerable violence, scattering fences, etc. These storms were accompanied by hail and an unusually heavy rainfall.

Mount Airy, Harris county: on the evening of the 19th, a severe storm passed about three miles south of this place, unroofing and demolishing houses, and causing other damage. Two persons were killed, and several were injured.

Jasper, Pickens county: at 2 p. m. of the 19th, it grew suddenly dark, and a low, rumbling sound was heard in the distance. Soon afterwards a huge mass of black cloud, bounding upward and downward and swaying to and fro, was seen passing south of this place towards the summit of Grassy Knob. Windows rattled and buildings shook as the whirling cloud passed in sight of, and within three miles of Jasper. The tornado cloud was visible about five minutes. It crossed the Western and Atlantic railroad near Cartersville—moving northeastward—and appears to have caused no damage until within seven or eight miles of Jasper. From that point over a path about fifteen miles in length the destruction of property was very great and about twenty persons were killed.

In Oconee county much fencing was blown down, and at Harmony Grove the storm was accompanied by very large hail, some of the hailstones weighing seven ounces.

Indian Springs, Butts county: the heaviest hail storm ever known in this vicinity occurred at 3 p. m. of the 19th, lasting about thirty minutes. At first the hail-stones were small but they increased to a remarkable size, some of them measuring nine inches in circumference.

Eatonville, Putnam county: two destructive storms passed over this county at about 4 p. m. of the 19th, causing great loss of life and property.

Monticello, Jasper county: on the afternoon of the 19th this place was visited by a tornado and hail storm. It came from the south and west and passed northward within one mile of Monticello, destroying much property in its path.

In Jones county the width of the tornado's path was about two hundred yards. Numerous houses were blown down, and twelve persons were killed. Several persons were also killed at Milledgeville, Butts county.

Warrenton, Warren county: at about dark on the evening of the 19th a violent tornado passed near this place causing great damage.

Louisville, Jefferson county: at 7 p. m. of the 19th a severe storm passed over this county, doing considerable damage. Its path was about one-half mile in width and extended through the entire county.

Union Point, Green county: the severest hail storm ever known here occurred at about 3 p. m., of the 19th. The hail stones were of a variety of shapes, covering the ground to an average depth of three inches, and in places they were drifted to much greater depths. Much damage was done to roofs and windows.

Washington, Wilkes county: the storm on the afternoon of the 19th, caused much damage at points southeast of this place. The hail accompanying it was unusually large.

Lincolnton, Lincoln county: a severe storm passed through this county within one mile of Lincolnton at about dusk of the 19th, its course being from southwest to northeast. The track of the storm was about one-half mile wide, and nearly every thing within it was destroyed. Four persons were killed.

Augusta: while the storm of the 19th caused no serious damage at this place, it was very destructive in neighboring localities. The greatest damage appears to have been done along the line of the Augusta and Knoxville railroad. The village of Bradley was almost entirely destroyed.

Sparta, Hancock county: a violent storm passed through the northwestern part of this county at about 5 p. m. of the 19th, in almost the exact path of the storm of March, 1875. Numerous out-houses and dwellings were destroyed.

Atlanta: on the 19th the wind attained a velocity of thirty-five miles per hour between 4 and 6 p. m., and was accompanied by heavy rain. On the 27th a storm occurred during which a wind velocity of thirty-six miles was recorded. Several buildings were damaged and chimneys blown off.

Baldwin, Randolph county: at about 4 p. m. of the 19th a storm of considerable violence passed west and south of this place, leveling fences, trees, etc.

Illinois.—Cairo: a storm occurred on the 12th between 4 and 6 p. m., during which the wind reached a velocity of forty-eight miles per hour, blowing down fences, signs, etc. At 2.07 p. m. of the 19th a violent storm struck this place. On its approach from the west-southwest, the darkness became so great as to make it necessary to light gas, etc. A violent whirling motion around a horizontal axis was observed in the cloud, and a loud roaring noise was heard during its passage. At Bird's Point, Missouri, (three miles southwest of Cairo) the storm apparently changed its course to the eastward. Over a track about two miles in length and one mile in width in the vicinity of Bird's Point, very large hail fell. Reports from surrounding localities clearly show that the storm was much less severe at Cairo than elsewhere, no damage having been done within the city limits or in the harbor where many boats were lying, although the wind blew, for five minutes, at the rate of 60 miles per hour. At Bird's Point about forty houses were badly damaged. The storm in its passage eastward proved very destructive to the submerged towns on the Ohio river, where so many buildings were weakened or undermined from the inundation. The damage caused at Paducah, Kentucky by the storm and flood during the night of the 19-20th, is estimated at \$125,000.

Kentucky.—Mount Sterling, Montgomery county: at 4 p. m. of the 19th a severe storm passed over this place, unroofing buildings and causing other damage.

Massachusetts.—Boston: during the storm of the 21st (low area ix.), the brig "Merrimac" went ashore off Nantucket, and was wrecked, the crew being saved by the Life-saving Service. On the 29th a heavy westerly gale (low area xiv.), prevailed during which the brig "Fleeting" was totally wrecked in Chatham bay.

Mississippi.—Vicksburg: from 11.50 to 11.55 a. m. of the 19th the wind blew at the rate of 60 miles per hour. The storm continued until 5.50 p. m., resulting in no serious damage in the city, but on the river serious losses were sustained. The steamer "Exchange" broke her lines and was driven upon the river bank and partially sunk. A barge laden with four hundred cords of wood was swamped, and about two hundred cords of wood were lost.

Columbus, Lounds county: a tornado passed through the southern part of this county on the 19th, doing great damage to dwellings and out-houses.

New Hampshire.—Mount Washington: during the 20th a violent hurricane prevailed. At 2.30 a. m. the anemometer was broken off. It is estimated that the wind velocity exceeded 160 miles per hour during the greater part of the forenoon.

New York.—Oswego: on the 20th (low area ix.) the wind reached a velocity of 37 miles per hour, blowing down trees and telegraph lines.

North Carolina.—Charlotte: the storm of the 19th was very destructive at a colored settlement known as Philadelphia, situated about two miles from Rockingham, on the Carolina Central railroad. The settlement contained about twenty-five cabins, which were all destroyed, and eleven of their occupants were killed. The trees in that vicinity were uprooted or twisted off and carried long distances.

Ohio.—Cleveland: during the storm on the 20th (low area ix.), trees were prostrated and telegraphic communication was interrupted; maximum wind velocity, 39 miles.

Coshocton, Coshocton county: a violent wind and rain storm (low area ix.) occurred on the 19th, doing great damage to trees and buildings.

South Carolina.—Ninety-six, Abbeville county: a dwelling was blown down and one of the inmates killed during the storm of the 19th.

At Andersonville, Anderson county, two persons were killed. **At Jackson, Aiken county** a dwelling and store-house were demolished and five persons killed.

Columbia, Richland county: the storms of the 19th were the most destructive ever experienced. At Chester, Chester county, more than forty houses and two churches were blown down, and a number of persons were killed. At Chappell's, Newberry county, on the line of the Greenville and Columbia railroad, not a house was left standing. At that place three freight cars were lifted from the railroad track and carried a distance of fifty yards. At Darlington, Darlington county, a large number of dwellings were wrecked, six persons were killed, and from twenty to thirty were injured.

Stateburg, Sumter county: between 10.30 and 11 p. m. of the 19th, a tornado passed within three miles of this place in a direction from southwest to northeast, blowing down trees and houses.

Tennessee.—Clarksville, Montgomery county: on the afternoon of the 19th this place was visited by two destructive storms, occurring about two hours apart. They passed through the central part of the city, levelling many dwellings and causing injury to others.

Knoxville: the storm on the night of the 19-20th is reported to have been very destructive at points along the railroad.

Texas.—Waco, McLennan county: at about 4 a. m. of the 12th a severe storm swept over this place, doing considerable damage to property.

Galveston: during a norther (low area xiv.) on the 27th the wind reached a velocity of 42 miles per hour, causing some light damage to shipping interests.

Virginia.—Marion, Smyth county: a severe storm occurred on the night of the 13-14th, blowing down trees, chimneys, etc.

SAND STORMS.

Yuma, Arizona, 18th.

NAVIGATION.

STAGE OF WATER IN RIVERS.

The Mississippi river continued frozen during the month at Keokuk, Iowa, and at stations northward. It was highest at Saint Louis, Missouri, on the 19th, and at New Orleans, Louisiana, on the 28th; at the latter station it reached a point one foot and one inch above the danger line.

Under the heading of "floods" will be found a table showing the stages of water for each day in the Ohio river at Pittsburgh, Pennsylvania; Cincinnati, Ohio, and Louisville, Kentucky, and in the Mississippi river at Cairo, Illinois; Memphis, Tennessee, and Vicksburg, Mississippi.

The Missouri river was frozen from the 1st to 25th at Leavenworth, Kansas, and throughout the month at Omaha, Nebraska, and at stations northward.

The Red river reached its highest stage at Shreveport, Louisiana, on the 27th, when it was two feet and ten inches above the danger line.

At Chattanooga, the Tennessee river reached a point three feet and ten inches above the danger line on the 11th.

The Cumberland river at Nashville, Tennessee, reached its highest stage on the 28th, when it was four feet and eleven inches above the danger line.

In the following table are shown the danger points at the various river stations; the highest and lowest stages for February, 1884, with the dates of occurrence; and the monthly ranges:

Heights of rivers above low-water mark, February, 1884.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>	<i>Ft. In.</i>		<i>Ft. In.</i>		<i>Ft. In.</i>	<i>Ft. In.</i>
Shreveport, Louisiana.....	29 9	27	32 7	6	9 3	23 4
<i>Arkansas:</i>						
Little Rock, Arkansas.....	33 0	16	26 3	1	4 3	22 0
Fort Smith, Arkansas.....		14	21 0	2	—1 7½	22 7
<i>Missouri:</i>						
Yankton, Dakota †.....	20 0					
Omaha, Nebraska †.....	16 0					
Leavenworth, Kansas †.....	21 0	26	5 6	28	5 1	0 5
<i>Mississippi:</i>						
Saint Paul, Minnesota †.....	14 6					
La Crosse, Wisconsin †.....	18 0					
Dubuque, Iowa †.....	21 10					
Davenport, Iowa †.....	15 0					
Keokuk, Iowa †.....	14 6					
Saint Louis, Missouri †.....	30 0					
Cairo, Illinois.....	40 0	21, 22, 24	51 10	1	25 8	26 2
Memphis, Tennessee.....	34 0	29	35 1	1	19 2	15 11
Vicksburg, Mississippi.....	41 0	29	44 11	6	30 8	14 3
New Orleans, Louisiana *.....	—2 6	28	—1 5	10	—5 6	4 1
<i>Ohio:</i>						
Pittsburg, Pennsylvania.....	20 0	6	33 4	29	6 4	27 0
Cincinnati, Ohio.....	50 0	14	71 ¾	29	26 2	44 10¾
Louisville, Kentucky.....	24 0	15, 16	46 7	29	10 10	35 9
<i>Cumberland:</i>						
Nashville, Tennessee.....	42 0	15	46 11	28	15 6	31 5
<i>Tennessee:</i>						
Chattanooga, Tennessee.....	33 0	11	36 10	29	9 7	27 3
<i>Monongahela:</i>						
Pittsburg, Pennsylvania.....	29 0	6	33 4	29	6 4	27 0
<i>Savannah:</i>						
Augusta, Georgia.....		18	22 6	7, 8	7 0	15 6
<i>Willamette:</i>						
Portland, Oregon.....		25	12 0	12, 13	1 5	10 7
<i>Sacramento:</i>						
Red Bluff, California.....		18	8 0	13, 14, 15	1 3	6 9
Sacramento, California.....		18	17 7	15	10 1	7 0
<i>Mobile:</i>						
Mobile, Alabama.....		19	16 8	20	14 1	2 7
<i>Colorado:</i>						
Yuma, Arizona.....		12	21 3	1	14 5	6 10

* Below high-water mark of 1874 and 1883. † Frozen throughout the month. ‡ Frozen part of month; see text. § below bench-mark.

ICE IN RIVERS AND HARBORS.

Broad lake.—Burlington, Vermont: the lake continues frozen from the 1st to 29th. Towards the close of the month a partial breaking up occurred in the Winooski and other rivers in this section.

Taunton river.—Taunton, Massachusetts: the river became free of ice on the 20th.

Connecticut river.—New Haven, Connecticut: ice in the river broke on the 20th.

Hudson river.—Albany, New York: the ice opposite Troy broke on the 8th, and the river became clear of ice for a distance of about one mile. Considerable damage was done to the bridge and other property along the docks. On the 14th, the ice broke at Albany and moved down the river forming an ice-dam at a point two miles below the city. The water rose rapidly and flooded the docks and lower parts of the city. The ice-dam was still intact on the 20th.

Salem creek.—Salem, Salem county, New Jersey: during the winter, the ice in the creek reached a thickness of ten inches. On the 18th, the creek was clear of ice, and navigation was resumed.

Lackawanna river.—Millville Depot, Lake county, Pennsylvania: ice broke up and went out of the river during the 7th and 8th.

Susquehanna river.—Port Deposit, Maryland: on the 8th, the solid field of ice which extended from this place to within a short distance of Havre de Grace gave way and passed out of the river into the bay.

Susquehanna river, (north branch).—Wilkesbarre, Pennsylvania: ice broke on the afternoon of the 7th, and the river rose

seventeen feet during the succeeding twelve hours. The flats between this city and Kingston were covered to a depth of twelve feet with large cakes of ice. The ice passed out without forming a serious ice-dam and the river subsided rapidly.

Catawissa, Columbia county, Pennsylvania: on the evening of the 7th, the ice broke up and went out of the river, without causing serious damage.

Delaware river.—Port Jervis, Orange county, New York: the ice broke up and went out of the river on the 7th.

Ohio river.—Pittsburg, Pennsylvania: the ice from the Youghiogheny river formed an ice-dam at the Smithfield street bridge, on the 5th. It broke and moved out on the same day, without causing damage. Heavy masses of drift-ice passed the city on the 7th; floating ice on the 2d, 5th, 8th and 29th.

Oswego river.—Oswego, New York: the ice began to break up on the 8th; floating ice on the 10th.

Genesee river.—Rochester, New York: the ice moved slightly on the 2d.

Lake Erie.—Buffalo, New York: considerable ice was broken up by the winds on the 14th, 20th and 21st.

Detroit river.—Detroit, Michigan: on the 3d, the river was clear of ice, except along the shores; floating ice on the 14th, and 27th; river frozen over on 29th.

Lake Michigan.—Milwaukee, Wisconsin, 29th: during the month, steamers plying between this place and ports on the opposite shore of the lake were much inconvenienced by ice. Several boats were surrounded by the ice-fields, and drifted with them for from four to five days.

Grand Haven, Michigan: the propellers "Michigan" and "Wisconsin" which were fast in the ice on the 1st and 2d, succeeded in reaching the harbor on the 3d. On the 4th the entrance to the harbor was free of ice; on the 22d it was again blockaded; on the 27th the propeller "Wisconsin" effected an entrance to the harbor.

Manistique, Schoolcraft county, Michigan: harbor open on 2d; lake open on 25th, and closed on 28th.

Grand river.—Grand Haven, Michigan: the river opened during the night of the 11-12th.

Green bay.—Escanaba, Michigan: the bay continued frozen during the month.

Saint Joseph river.—Mottville, Saint Joseph county, Michigan: ice broke in river on the 5th.

Maumee river and bay.—Toledo, Ohio: on the 6th the ice from the bay to the Lake Shore railroad bridge, was from nine to fourteen inches in thickness and was solid from shore to shore. On the 8th the ice in the river opposite the city began to break. At south Toledo a large ice-dam formed, and the water rose four feet above the high-water mark of 1883. Large masses of ice were running beneath the surface ice. On the 15th the river began to fall, and drift-ice was running. On the 25th the ice above the bridges began to break up; but it was again solid from shore to shore on the 28th.

Tuscarawas river.—Canal Dover, Tuscarawas county, Ohio: the ice broke up on the afternoon of the 5th, causing slight damage.

Cuyahoga river.—Cleveland, Ohio: the ice broke up and went out of the river on the 5th, causing no damage.

Sandusky river.—Fremont, Ohio: the ice-dam in the river, above town, broke on the morning of the 6th, but formed again about one-half mile below, flooding the Wheeling and Lake Erie railroad track and submerging the flats on the east side.

Auglaize river.—Defiance, Ohio: ice began to move out of the river at 3 p. m. of the 6th. An ice-dam was formed in the Maumee river about one mile below here. At 4.30 p. m. the ice-dam gave way, causing but little damage. The ice in the Maumee above this place remained firm.

Conneaut river.—Conneaut, Ohio: the ice in the river broke up and went out on the 6th. The dam at Rathburn's mill was broken and other damage resulted.

Wabash river.—Logansport, Indiana: on the 5th the ice broke up and went out of the river without causing damage.

Mississippi river.—Saint Louis, Missouri: floating ice on the 8th, 14th, 15th, and 16th. At Keokuk and points above, the river continued frozen throughout the month.

Missouri river.—Leavenworth, Kansas: on the 28th the river opposite the city was nearly clear of ice; opposite Fort Leavenworth it remained firm. At points above this place the river continued frozen throughout the month.

Republican river.—Red Willow, Red Willow county, Nebraska: the ice in the river and in Red Willow creek was partly broken up on the 25th.

Snake river.—Lewiston, Idaho: the ice in the river broke up on the 24th.

Spokane river.—Fort Spokane, Washington territory: the river was frozen on the 7th.

Miscellaneous.—Thornville, Lapeer county, Michigan: at the close of the month the ice in the ponds in this vicinity was about eighteen inches thick.

Garrettsville, Portage county, Ohio: the ice in Silver creek broke up on the 5th.

FLOODS.

During the flood of February, 1883, in the Ohio river, the water rose above the highest water marks of any previous record in the vicinity of Cincinnati and at points southward. The flood of February, 1884, in the Ohio river, surpassed that of February, 1883. At Pittsburg, Pennsylvania, the highest stage of water was five feet, ten inches above that of 1883; at Cincinnati, four feet, eight and three-fourths inches; at Louisville, Kentucky, two feet, two inches, while the Mississippi river at Cairo, Illinois, during 1883, was four inches higher than the highest point of February, 1884; and at Memphis it was six inches higher. In the lower Mississippi, the water rose to a greater height than was attained in February of last year. At Vicksburg, the river was still rising at the close of the month and was nearly three feet higher than the highest stage of February, 1883, and at New Orleans it was one foot, seven inches higher.

In the table below are shown the stages of water in the Ohio river and at stations on the lower Mississippi during February, 1884, the observations being made at 2 p. m. Washington time.

Station.....	Ohio River.			Mississippi River.		
	Pittsburg.	Cincinnati.	Louisville.	Cairo.	Memphis.	Vicksburg.
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
Danger-point.....	20 0	50 0	24 0	40 0	34 0	41 0
February 1.....	20 5	38 8	13 7	25 8	19 2	31 11
2.....	17 4	46 2	16 10	26 6	19 3	31 8
3.....	12 10	49 5	21 7	29 5	19 5	31 4
4.....	11 1	49 11	24 0	32 5	19 11	31 1
5.....	15 10	52 8	27 8	34 7	21 9	30 10
6.....	31 11	59 5	34 1	37 10	24 4	30 8
7.....	31 8	51 2	38 5	40 10	26 3	31 1
8.....	26 3	62 7	39 8	42 8	28 5	32 4
9.....	21 3	63 9	40 3	44 0	30 0	33 7
10.....	18 5	64 11	40 4	45 1	31 3	35 0
11.....	16 11	66 5	41 1	46 0	32 0	37 0
12.....	18 4	68 5	42 4	46 10	32 4	38 2
13.....	18 0	69 11	44 0	47 7	32 10	39 4
14.....	17 10	71 3/4	45 7	48 4	33 2	40 4
15.....	20 10	70 1	46 6	49 2	33 6	40 11
16.....	17 11	68 4	46 6	49 10	33 9	41 6
17.....	14 3	66 0	45 8	50 5	34 2	42 0
18.....	12 9	63 5	44 5	50 10	34 3	42 7
19.....	13 3	60 3	42 0	51 3	34 5	43 1
20.....	12 0	58 10	41 3	51 7	34 6	43 4
21.....	12 6	55 5	39 1	51 9	34 7	43 7
22.....	11 5	52 0	36 1	51 10	34 10	43 10
23.....	10 1	48 5	32 11	51 10	34 10	44 1
24.....	9 0	45 2	29 0	51 10	34 10	44 3
25.....	8 1	40 10	24 8	51 8	34 11	44 5
26.....	7 6	36 10	19 9	51 5	34 10	44 7
27.....	7 2	32 11	15 2	51 2	34 11	44 9
28.....	6 10	29 6	11 4	50 7	34 11	44 10
29.....	6 4	26 2	10 10	50 0	35 1	44 11

* At 10 p. m. of the 6th, gauge read 33 feet 4 inches.

From the above table it will be seen that at Pittsburg the river was above the danger from the 5th to the 9th; at Cincinnati, from the 5th to 22d; at Louisville, from the 4th to 25th; at Cairo, Memphis and Vicksburg from the 7th, 17th and 16th, respectively, to the end of the month.

In the following table are given the highest and lowest stages of water at stations on the Ohio and lower Mississippi rivers, during the February floods of 1883 and 1884.

Ohio River.

Station.	Pittsburg.				Cincinnati.				Louisville.			
	Highest.		Lowest.		Highest.		Lowest.		Highest.		Lowest.	
	Date.	Height.	Date.	Height.	Date.	Height.	Date.	Height.	Date.	Height.	Date.	Height.
Feb., 1883.....	8	27 6	3	5 6	15	56 4	3	25 10	16	44 5	3	11 2
Feb., 1884.....	6	33 4	29	6 4	14	71 3/4	29	25 2	15, 16	46 7	29	10 10
Danger-line....	20 feet.				50 feet.				24 feet.			

Mississippi River.

Station.	Cairo.				Memphis.				Vicksburg.			
	Highest.		Lowest.		Highest.		Lowest.		Highest.		Lowest.	
	Date.	Height.	Date.	Height.	Date.	Height.	Date.	Height.	Date.	Height.	Date.	Height.
Feb., 1883.....	25, 27	52 2	6	28 11	28	35 7	1 to 5	22 11	28	42 2	1	24 7
Feb., 1884.....	21, 22, 24	51 10	1	25 8	29	35 1	1	19 2	29	44 11	6	30 8
Danger-line....	40 feet.				34 feet.				41 feet.			

The following reports relative to the flood of February, 1884, in the Ohio, and in the Mississippi river below Cairo, Illinois, have been received from various sources. The reports from the several stations are given in the order in which they would be successively passed in proceeding southward from Pittsburg, Pennsylvania.

Pittsburg, Pennsylvania.—During the morning of the 5th, both the Monongahela and Allegheny rivers began to rise rapidly, the Monongahela reaching the danger line about noon. At 11 p. m. of the 6th it reached its maximum height, thirty-three feet, four inches, or thirteen feet, four inches above the danger line. This is the highest stage that has occurred since 1832, when it reached thirty-five feet. All the avenues in the lower portions of Pittsburg and Allegheny City were flooded. Both cities were without gas, and railroad communication was cut off. As a result of this flood over five thousand people were rendered temporarily homeless, and property valued at more than \$2,000,000 was destroyed. On the 7th a large part of Allegheny City was still under water, but in Pittsburg, on that date, only the cellars were flooded. On the 8th, people returned to their homes in the submerged districts, operations were resumed on the railroads, and the city gas supply was restored. At 10.30 p. m. of the 9th the river fell below the danger line.

Wellsville, Columbiana county, Ohio.—On the 9th the river began to recede rapidly, but the water was still from five to eight feet deep in the lower part of the town. From 1,500 to 2,000 people of this place sustained losses by the flood, many losing their entire possessions. At Industry, Pennsylvania (near Wellsville), eight dwellings were carried away and a number of others were ruined.

Wellsburg, Brooke county, West Virginia.—On the 7th the Ohio river reached the greatest height ever known at this point, when it was thirty-three inches higher than the great flood of 1883. The loss of property, distress, and destitution resulting from the flood were very great. There were only three or four houses in the main part of the town that were not partly under water. The assistance from the government was timely, and relieved many destitute and suffering people.

Staubenville, Jefferson county, Ohio.—At 6 p. m. of the 6th the river reached a depth of forty-four feet, when all the lower

portions of the city were submerged and many families had to be removed from their homes. The Cleveland and Pittsburg railroad company were compelled to discontinue operations from Pittsburg to Bellaire for the first time in the history of the road, several miles of the track being under water. All creeks in this vicinity overflowed, rendering many families homeless. The river reached its highest point, forty-nine feet, at 2 p. m. of the 7th, when it was two feet higher than the flood of 1842. The river began to recede on the morning of the 8th. The entire loss resulting from the flood in the vicinity of Staubenville is estimated at \$500,000. More than three hundred families were rendered homeless. At 7 p. m. of the 9th the river had fallen eighteen inches.

Wheeling, West Virginia.—The river continued to rise during the 7th. On that date the submerged area was considerably larger during the flood of 1832. Property valued at about \$1,000,000 was destroyed in that vicinity. On the 8th, it was reported that in this city and on both sides of the river, from Wellsburg (sixteen miles above) to Madisonville (twelve miles below), the lowest estimate of the number of persons homeless and subsisting on charity was 25,000, and the damage to property, \$6,000,000. On that date the water reached a depth of six feet above the high water mark of 1852. The river fell rapidly on the 10th.

Reports from Marietta, Ohio, on the 10th, stated that about three-fourths of that place was inundated and a large number of houses had been swept away. On the 18th, it was shown from actual count that four hundred and fifty houses and barns had been moved from their foundations.

Parkersburg, West Virginia.—The flood began to subside on the 11th. When at its highest stage, fifty-three feet, three inches, the river was more than three feet higher than the flood of 1883. For three days this city was entirely cut off from outside communication. Thousands of people were rendered homeless and were quartered in the churches and the public buildings. More than one hundred houses were carried away and many others were undermined. Thirty-seven cars of the Ohio River Railroad Company were swept away. On the 12th, it was estimated that the losses sustained at Parkersburg would aggregate \$750,000.

Belpre, Washington county, Ohio.—The river reached a height of sixteen inches above any previous flood on the 10th. More than twenty dwellings were floated away and all of the business part of the town was submerged. On the 12th a careful count of the houses washed away, showed the number to have been forty-nine. On that date the water had fallen about nine feet, but much of the town was still under water.

Pomeroy, Meigs county, Ohio.—On the 6th the river reached a height of forty-seven feet and continued to rise. The yards of the Columbus, Hocking valley and Toledo railroad company were covered with five feet of water. Business was generally suspended.

Gallipolis, Gallia county, Ohio.—At 6 p. m. of the 8th the river was twenty-six inches above the highest point of the flood of 1883, and continued rising. The river rose steadily during the 10th, on which date it was fifty-one inches above the flood of 1832. The lower part of the city was submerged, and many families were compelled to move. The river began to fall at 1 a. m. of the 12th.

Catlettsburg, Boyd county, Kentucky.—The river continued to rise during the 8th, on which date about fifty business houses and one hundred and twenty-five residences were submerged. The court-houses and other public buildings were thrown open for those rendered homeless. At 6 p. m. the water was within ten inches of the high-water of February, 1883, and on the evening of the 9th it had risen to two feet above that point. Fifty residences were submerged that escaped the flood of last year. Every business house in the town, and four-fifths of the residences, were flooded. It is estimated that \$100,000 will not cover the losses sustained. On the 10th the river was three feet above the highest point of 1883. On that date there were one hundred and fifty residences from three to

twelve feet under water, and sixty business houses were submerged, leaving only twenty houses in the town above the water line.

Ashland, Boyd county, Kentucky.—The river reached its highest point on the 12th, when it was seven feet, ten inches above high water of 1883. One half of Ashland was inundated and hundreds of families were driven from their homes. On the 15th, the river had fallen about six feet and continued to recede slowly after that date.

Ironton, Lawrence county, Ohio.—Telegraphic and railroad communication was cut off from the 7th to 15th. When at its height the flood covered four-fifths of the city. Many houses were swept away or moved from their foundations.

Portsmouth, Ohio.—The river reached a height of fifty-three feet on the 6th, causing about four hundred families to leave their homes on the afternoon of that date. During the night of the 6-7th the entire southeastern part of the city was flooded and hundreds of people were sheltered in the school houses and other public buildings. At noon of the 9th, the river was within one inch of the flood of 1832. It continued to rise until 6.30 p. m. of the 12th when it was sixty-six feet, three and one-half inches above low-water; four feet, seven inches above the flood of 1832; and five feet, nine inches above the flood of 1883. Nearly the whole of the city was under water and many houses near the river were washed away. The storm of the night of the 13th caused great damage to the inundated buildings.

Maysville, Mason county, Kentucky.—On the 6th, it was apparent that the flood in the Ohio would exceed that of 1883. Several families on Front street were compelled to abandon their homes. On the 8th, the river was within seventeen inches of the high water of 1883. At 10 a. m. of the 9th, it reached the high-water mark of 1883, at which time it was within from two to three inches of the great flood of 1832. About two hundred families in Maysville, Chester and Aberdeen were driven from their homes.

Ripley, Brown county, Ohio.—On the 14th, fully four-fifths of the town were submerged. On all of the principal streets the water was from five to fifteen feet deep. On Front street, the houses were abandoned, and under water to the second stories. The losses resulting from the flood were fully as great as those sustained last year. Many houses were swept from their foundations, and about two hundred families were rendered homeless.

Dayton, Campbell county, Kentucky.—Fully two-thirds of the town were under water on the 14th, when about four hundred and fifty houses were submerged and about six hundred families were dependent on charity. On the 16th it was estimated that this town had suffered to the extent of \$75,000.

Cincinnati, Ohio.—The river rose to the danger-line on the afternoon of the 4th. During the twenty-fours ending at 1.30 a. m. of the 6th it rose six feet, nine inches. On the 5th and 6th active preparations were made for removing property out of danger by the residents and others engaged in business along the river front. The following warning was given the public on the 6th by the Chief Signal Officer:

OFFICE CHIEF SIGNAL OFFICER,
Washington, D. C., February 6, 1884.

From two to three inches of rain is reported in the Ohio valley during the last twenty-four hours. The river is rising rapidly at all points. Seven to eight feet above the danger-line at all points from Louisville northward. Floods will increase and prove very destructive. Give general warning. Property and stock should be moved to points above the danger-line. Floods will reach the Mississippi early next week.

W. B. HAZEN,
Chief Signal Officer.

On the 6th the chamber of commerce and city council took measures for the relief of those rendered needy, and large sums of money were raised by appropriation and subscription. Along the bank of the river, on Eastern avenue, all dwellings were submerged and abandoned. The whole area from McLean avenue to the foot of Price's hill, and from Duckworth's distillery to the mouth of Mill creek, was covered with water. All buildings below the level of Eighth street were submerged,

and also the lower part of Cumminsville, compelling hundreds of families to vacate the lower stories of their dwellings. In Newport, Kentucky, it was estimated that more than one thousand houses were under water.

On the 9th, at 1.30 p. m., the river-gauge showed a depth of sixty-three feet, nine inches, or thirteen feet, nine inches above the danger-line. Mill creek on this date was nearly a mile wide in some places, and at noon the water reached the middle of Spring Grove cemetery. On Broadway the water was above Second street. The public schools were closed and the buildings thrown open for the use of the sufferers.

At 1.30 p. m. of the 11th the river had risen to sixty-five feet, five inches, or one inch above the highest point attained by the flood of February, 1883. The gas works were completely submerged, and the manufacture of gas was discontinued. The last engine at the city water works stopped running, and the inhabitants were cautioned to exercise economy in the use of water. In the northwestern part of the city Harrison avenue and the flooring in the Cincinnati, Washington and Baltimore railroad depot were completely covered. At the Duckworth distillery the water reached the second stories of the building. The dwellings and factories on both sides of Harrison avenue up to Western avenue were flooded. At Mill street the water had reached the middle of the square between Third and Fourth streets. The following streets were flooded to depths ranging from two to fifteen feet: Dodsworth avenue, Elmore, Burgoyne, Cooper, Dormann and Hoffner streets. On Colerain pike the water extended from Mill creek bridge to the Cincinnati, Hamilton and Dayton railroad, and on Spring Grove avenue it extended from the bridge to Winton road.

At 2 a. m. of the 12th, the river had attained a depth of sixty-seven feet, six and one-half inches, or one foot, two and one-half inches above the highest point of the flood of last year. Over 5,000 persons were provided with shelter within the city school buildings. Traffic on all of the railroads was interrupted, trains being unable to reach the depots.

A proclamation was issued by the Governor of the state on the 12th, appealing for aid for the sufferers of the flooded districts, and urging the organizations of relief committees.

At 2 a. m. of the 13th the depth of water was sixty-nine feet, two inches—nearly three feet above the maximum height of the flood of 1883. The buildings in the lower portions of Cumminsville were entirely submerged and that suburb was cut off from the city.

In Newport, on this date, only a small portion of the thickly populated part of the city remained out of water. A number of frame houses in the submerged districts were loosened from their foundations and capsized.

At 3 a. m., of the 14th, a height of seventy feet, nine and one-half inches was attained. The suffering among the inhabitants of the inundated districts and the destruction of property became more widespread. The highest stage was reached at 11.30 a. m., when the water was seventy-one feet and three-fourths of an inch above low water (the highest stage ever known), and was four feet, eight and three-fourths inches above the great flood of 1883. The cold weather with the increasing flood caused intense and widespread suffering among those rendered homeless. At Cumminsville, the water extended from the stock yards to Grear's Turf exchange on Spring Grove avenue. At Linwood, the levee was entirely covered with water and Mount Washington and Newton were completely cut off from the city. All passengers leaving the city were conveyed in boats to various points where connection could be made with the railroads. With the increasing flood the condition of Newport grew worse. A large majority of the population of the city were rendered homeless and destitute. Numerous brick houses caved in by having their foundations washed out, while many frame houses were floated away. At 2 p. m., the river had fallen one-half inch, at which stage it remained stationary until 6 p. m.; the decline from that hour until 2 a. m. of the 15th, was three and one-half inches. During the 15th the waters gradually subsided. On that date

the foundations of several buildings were undermined. The most serious disaster of this character occurred during the early morning, on the corner of Third and Ludlow streets, which resulted in the loss of ten lives.

The Signal Service observer at Cincinnati reports, concerning the flood, as follows:

At 11.30 a. m. of the 14th, the Ohio river reached the greatest height ever known; seventy-one feet and three-fourths of an inch being noted on the water-works river gauge. The timely warning given by the Signal Service of the approaching danger, together with the experience of the flood of 1883, enabled the people in a great measure to prepare to meet the danger. The losses, consisting of household goods, were much less than those sustained during the flood of last year, but the damage to buildings, etc., was much greater. In Covington, Kentucky, four hundred houses were invaded by the water, and about 3,000 people received assistance from the relief committees. One-third of Newport, Kentucky, was under water, and 13,000, out of a population of 20,400, were more or less seriously affected by the flood. Navigation on the river was entirely suspended, the high water not permitting the passage of boats under the bridges. Travel on all railroads entering the city was interrupted, and the mails were received very irregularly. All of the engines in the city water-works were stopped, in consequence of which great fears of a water famine were entertained. The Shield's engine was, however, started on the 17th, when the river had fallen to sixty-five feet.

It is not possible at the present time to give an accurate estimate of the damage resulting from the flood, but it is variously estimated at from \$10,000,000 to \$25,000,000. In February, 1883, the river was above the danger-line from the 8th to the 23d; during the present year it was above the danger-line from February 4th to 23d.

Lawrenceburg, Indiana.—On the 6th, the track of the Ohio and Mississippi railroad, both east and west of the city, was washed away. East of Lawrenceburg, as far as the eye could reach, there was nothing visible but a broad expanse of water covering thousands of acres of valuable land. About fifteen hundred of the population left the city. Up to this date but little damage was done aside from that caused by the inundation. Out of four thousand inhabitants of Old Town all, with the exception of about one hundred, left the place. On the 8th, one thousand people were being cared for by the relief committee. The river continued to rise on the 9th, and many barns and outbuildings were undermined or floated away. About thirty additional buildings were wrecked on the 11th, and more than one hundred were wrecked on the 12th. The water continued to rise and reached its greatest height on the 14th. On that date two thousand six hundred people appealed to the Commissary Department for relief. A number of additional houses were washed away. In one locality in Germantown an entire square of buildings was carried away. On the 14th, it was estimated that the destruction of property by the flood was twice as great as that caused by the flood of last year.

Aurora, Indiana.—On the 6th the river reached the flood line of 1882, the floor of the iron bridge west of the city being three feet under water. That part of the city between George street and the river was under water. People living in the inundated part of the city removed their effects in time to avoid loss, and all persons living below the flood line of 1883 moved to higher ground. The greater part of the Ohio and Mississippi railroad track, between this city and Lawrenceburg, was under water. At 6 p. m. of the 10th, the water passed the flood line of 1832; At 7 p. m. of the 11th, it passed the flood line of 1883 and continued to rise. On the 12th nearly all houses east of George street were abandoned, and many buildings that withstood the flood of 1883 were raised from their foundations. At 8 p. m. of the 13th, the river was two feet, seven inches above the flood of 1883.

Warsaw, Gallatin county, Kentucky.—On the 6th the river gradually approached the high water mark of 1883. The inhabitants were sheltered in the court house and other public buildings. Much property was saved by being removed to places of safety.

Vevay, Indiana.—The river overflowed its banks at several points in this vicinity on the 5th, compelling the inhabitants of the lower part of the town to abandon their homes. On the 6th the lower part of the town was entirely under water;

at 7 a. m. of the 13th the river was six inches above the highest stage of 1883, and continued to rise. Great destruction of property resulted, houses and fences being swept away. After this date the river continued to rise uninterruptedly, and on the morning of the 14th it was sixty-one inches higher than the flood of 1832, sixty-six inches higher than the flood of 1847 and twenty-two inches above the flood of 1883. At 7 a. m. of the 15th the water had receded one inch; and afterwards it continued to fall. By the 26th the water had entirely disappeared from the late inundated portions of the town, leaving evidences of great destruction. Of many buildings only the foundations remained, huge piles of debris had accumulated, fragments of furniture and the bodies of dead animals were scattered around. The only benefit derived from the flood was a deposit of rich alluvial soil varying in depth from ten to eighteen inches.

Carrollton, Carroll county, Kentucky.—About seventy-five dwellings and all of the saw mills and distilleries were flooded on the 6th.

Madison, Jefferson county, Indiana.—On the 6th, all houses along Front street were abandoned and the Jeffersonville, Madison and Indianapolis depot was entirely surrounded by water. The town of Milton, Kentucky, opposite Madison, was almost entirely inundated, and most of the buildings were flooded. The river reached its highest point on the 15th, when it was twenty-seven and one-half inches above the high water mark of 1883.

Louisville, Kentucky.—The river passed the danger line on the 4th. The following telegram from the Chief Signal Officer was received during the night of the 4-5th:

Heavy rains have fallen in the states of the Ohio valley which will cause dangerous floods in the upper Ohio river and its tributaries during Tuesday, Wednesday and Thursday.

On the 6th the following warning was received:

Heavy rains continue in the Ohio valley. The river is rising at all points and is above the danger-line at Pittsburg, Cincinnati, and Louisville. Floods will increase and at the end of the week will reach the mouth of the Ohio river. Give general warning.

On the 7th, residents on the "Point" abandoned their homes, and Shippingport and vicinity was inundated. Cut-off embankment was broken and hundreds of houses were flooded. The river continued to rise and, on the 11th, it was within three feet of high water mark of 1883. The entire wharf in front of the city was under water. On this date the following telegram was received from the office of the Chief Signal Officer:

Rains are indicated for the Ohio valley and Tennessee to-day and to-night. River will rise above the highest water mark of last year at Cincinnati and at points below.

At 9 p. m. of the 13th the river had risen to a height surpassing all previous records. On this date the destruction along the river front was greater than at any time since the beginning of the flood. The brisk wind caused the waves to undermine many substantial buildings during the 13th and 14th. On the latter date Shippingport was almost entirely hidden from view by the flood. The river attained its greatest height, forty-six feet, seven inches, at 9.30 p. m. of the 15th, when it was two feet, two inches above the flood of 1883. The river remained stationary during the night and on the morning of the 16th, it began to fall slowly; after that date it continued falling and on the 25th was again within its banks. During the flood there were five hundred houses on the "Point," three hundred in Shippingport and Portland, and one hundred on the banks of the Beargrass creek, submerged to a greater or less extent. Although the flood rose to a greater height than that of 1883, it did not cause as much damage. Property owners, having had timely warning of the approaching danger, took every precaution to avoid losses, and by this means much property was saved. The total losses sustained are estimated at about \$100,000.

New Albany, Indiana.—The river rose steadily during the night of the 11-12th, and the back water from Silver creek

submerged several hundred houses in the northwestern part of the city. Lower Albany was under from ten to twenty feet of water. At 8 p. m. of the 13th, the river was within five inches of the flood of February, 1883. During the night of the 12-13th a number of dwellings and other buildings were floated away. The river reached its maximum height on the afternoon of the 15th, when it was twenty-one inches above the highest point reached last year. On the 18th, the river had declined thirty inches from its highest stage. The damage to property was estimated at from \$200,000 to \$300,000.

Laconia, Indiana.—The Ohio reached its highest stage on the 16th, when it was twenty inches above the great flood of 1883. The bottom lands were overflowed, the water reaching the second floors of many of the houses, some of which were washed away.

Evansville, Indiana.—On the 13th the river was within seventeen inches of the flood of 1883, but this place suffered no damage. At 10 p. m. of the 15th the river was forty-seven feet, two and one-half inches above low water and within seven inches of the high-water mark of 1883.

Shawneetown, Illinois.—All business was suspended and the entire town was submerged to a depth averaging eight feet on the 15th. Not more than one-fourth of the two thousand inhabitants remained in the town. On the 19th one-half of the frame buildings in the city had been moved from their foundations.

Paducah, Kentucky.—On the 19th the town was completely surrounded by water and one-half of the city was inundated. The damage at this place is estimated at \$200,000.

Cairo, Illinois.—The high water of February, 1884, was one-half of an inch, and four inches, respectively, below the high-water marks of 1882 and 1883, while at Mound City, seven miles above Cairo, the high water of February, 1884, exceeded the maximum heights of 1882 and 1883. The flood of February, 1884, did not cause injury to property at Cairo, and all kinds of business, with the exception of railroad traffic, were carried on without interruption. The tracks of all the railroads running out of the city, excepting that of the Illinois Central, were submerged on the 13th, when the river had reached a height of forty-eight feet. The highest water at Cairo reached the tops of the lowest parts of the levees only, and bulkheads were erected at these places. All of the levees at this place have been built higher and wider since the flood of 1883. The flood warnings issued by the Chief Signal Officer were published and given wide circulation.

Memphis, Tennessee.—The river began to overflow in places opposite this city on the Arkansas shore on the 14th; it reached the danger line on the 17th; on the 19th traffic on the Memphis and Little Rock railroad between Hopefield and Madison, Arkansas, was suspended on account of the overflowed condition of the road. At the close of the month the river was one foot and one inch above the danger line, and continued to rise.

Vicksburg, Mississippi.—The river rose steadily after the 6th, passing the danger line on the 16th, and reaching the highest stage of the month on the 29th, when it was three feet, eleven inches above the danger line. On the 25th it was reported that the water had broken the levee three miles below Delta, Louisiana, making a crevasse seven hundred and fifty feet in width. The track of the Vicksburg, Shreveport and Pacific railroad was covered with three inches of water between Mounds and California stations. On the 29th, Kleinston, a suburb of Vicksburg, was overflowed to a depth varying from six inches to two feet.

Floods also occurred during February in various rivers and streams as follows:

Allegheny river.—Oil City, Pennsylvania: the railroads in this vicinity were greatly inconvenienced by land slides and overflowed tracks on the 6th. The flood did not approach within five feet of the high water of 1883.

Coneloquinet creek.—Harrisburg, Pennsylvania: the ice in the creek broke up on the 9th, causing a destructive flood. Four bridges (valued at \$80,000), over the creek, between Carlisle

and the Susquehanna river, were washed away. The freshet was the most destructive that ever occurred in that locality.

French creek.—Meadville, Crawford county, Pennsylvania: all of the southern and western portions of the city were submerged on the 6th, and the factories in those localities were closed.

Maumee river.—Napoleon, Henry county, Ohio: during the evening of the 6th, the ice broke up in the river and moved out, damaging the bridge to some extent. An ice dam formed eight miles east, causing the river to rise to a point eight inches higher than ever before known. All of the lower part of the town was submerged, the water reaching the second stories of many dwellings. At 6 p. m. of the 7th, the ice dam broke and the water receded rapidly.

Sandusky river.—Upper Sandusky, Wyandot county, Ohio: the heavy rains of the 5th and 6th caused the river to rise to such an extent as to overflow the bottom lands and cause much damage by sweeping away fences, grain stacks, etc.

Blanchard river.—Ottawa, Putnam county, Ohio: the river reached its highest point during the early morning of the 7th, when it was thirty feet, four inches above low water. The damage at this place is comparatively light, but the farmers near the river sustained heavy losses. On the 8th the river had fallen six feet. The total loss caused by the flood is estimated at \$2,000.

Cuyahoga river.—Cuyahoga Falls, Summit county, Ohio: the unfinished bridge across the river was swept away by the high water of the 6th.

Hockhocking river.—Nelsonville, Athens county, Ohio: the flood of the 5th and 6th was the most destructive that ever occurred in this vicinity. By the breaking of the levee fully one-third of the city was suddenly submerged, the citizens barely escaping with their lives. Numerous houses were swept from their foundation and carried off. One railroad bridge and fifteen loaded cars were swept away.

Lancaster, Fairfield county, Ohio: the heavy rains of the 5th and 6th flooded the Hockhocking valley to a greater extent than has been known for many years.

Athens, Athens county, Ohio: the river reached its greatest height at noon on the 9th, when a height, nine inches higher than was ever before known, was attained. At 7 p. m. the river had fallen eight inches.

Logan, Hocking county, Ohio: the flood of the 6th and 7th was one of the most destructive ever experienced here. From seventy-five to one hundred houses were partly inundated and much suffering was caused among the inhabitants.

Scioto river.—Columbus, Ohio: the river at 9 p. m. of the 6th, was within one foot of the high-water of February, 1883, and continued rising. The dykes below the city broke during the night, causing about one hundred families to vacate the houses or to remove to the upper stories of the buildings. The losses to manufacturing and other interests were very great.

Circleville, Pickaway county, Ohio: the river reached its highest point on the morning of the 18th, when it was within seven inches of the highest point of last spring.

Reports from Waverly, Pike county, Ohio, on the 10th, stated that the flood in the Scioto river, in that vicinity, was the most destructive ever known. The levee was damaged to the extent of more than \$50,000, and a great deal of live stock was drowned. Traffic on the Scioto Valley and Ohio Southern railroads was entirely abandoned on account of the wash-outs and the loss of bridges. The damage occasioned by the flood in the vicinity of Waverly is estimated at \$100,000.

Paint creek.—Chillicothe, Ross county, Ohio: on the 6th the creek rose to a greater height than was ever before known, and everything in the low lands was inundated. The Ohio and Erie canal aqueduct, a structure over the creek which had withstood the freshets of fifty years, was washed away during the afternoon, carrying with it the Scioto railroad bridge located a short distance below. Trains were discontinued on the Toledo, Cincinnati and Saint Louis railroad.

Greenfield, Highland county, Ohio: on the 6th Paint creek

rose to a height fully two feet above any previous flood. At about 11 a. m. the large double-spanned bridge over the creek east of the town gave way. About two miles of the Ohio Southern railroad track below Bainbridge were washed away.

Muskingum river.—Zanesville, Muskingum county, Ohio: the river rose steadily during the 6th and 7th; on the latter date it reached a height within eight inches of the high-water mark of 1860. Half of the eighth ward and many houses in other sections of the city were under water. The river began to fall on the 9th, when the railroads resumed operations. The total losses in Zanesville and vicinity are estimated at \$150,000.

Tuscarawas river.—Coshocton, Coshocton county, Ohio: the Tuscarawas and Walhonding rivers on the 6th were within three feet of the flood mark of last February. The farmers in the lowlands suffered heavy losses from the overflow. During the night of the 7th the Tuscarawas river reached the highest point known since the settlement of the country. The residents of the lower part of the town were compelled to move to higher ground.

Newcomerstown, Tuscarawas county, Ohio.—The Tuscarawas river reached a greater height on the 7th than was ever before known.

Canton, Stark county, Ohio.—On the 6th railroad traffic was almost at a standstill, owing to submerged tracks and washouts. Many streets in the northern part of the city were overflowed and rendered impassable.

Massillon, Stark county, Ohio.—The water in this city and vicinity during the evening of the 6th, closely approached the height reached by the great flood of 1883, when the water in the river rose to a greater height than had been known for fifty years. A large part of the town was inundated, and many families were compelled to vacate their houses. All barns and outbuildings on Sippo race were submerged. On the morning of the 7th the river was within seven inches of the greatest height attained in 1883. About twenty-five dwellings, in addition to those before reported, were submerged on this date.

Mahoning river.—Youngstown, Mahoning county, Ohio: the river overflowed on the 6th and inundated a part of the town, compelling many families to leave their homes. Several factories were submerged and compelled to suspend work. The railroad track was inundated, preventing the running of trains. This flood was the severest ever known in the Mahoning valley. The river fell one foot during the 8th. The track of the Painesville and Youngstown railroad was completely washed away for a distance of half a mile. No trains passed over the Pittsburg and Lake Erie railroad from the 5th to the 8th.

Warren, Trumbull county, Ohio: the flood of the 6th was one of the most destructive ever known in the Mahoning valley. A general suspension of business resulted and thousands of men were thrown out of employment.

Miami river.—Dayton, Montgomery county, Ohio: the river at this point continued to rise steadily during the 5th and 6th. On the latter date it rose to within three feet of the highest stage of February, 1883. Numerous cellars along the river were submerged, and the lowlands were overflowed, causing heavy losses to the farmers.

Wabash river.—The entire town of Markle, Huntington county, Indiana, was covered with water on the 6th. An iron bridge over the river, near that place, was swept away during the afternoon.

Cumberland river.—Nashville, Tennessee: during the 10th the water rose nearly to the danger line, compelling a few families in north Nashville to move. The river reached the danger line on the afternoon of the 11th and continued to rise until the afternoon of the 15th, when it reached its highest stage, forty-six feet and eleven inches, or nearly five feet above the danger line. On that date about seventy-five families had abandoned their homes and about one hundred and fifty buildings were under water. The river was fully two and one-half miles in width at a point one and one-half miles below the city. The losses resulting from the overflow are estimated at about \$5,000. The river remained above the danger line until the 20th.

Tennessee river.—Chattanooga, Tennessee: the river rose rapidly on the 8th, and continued to rise until the 11th, reaching its highest stage on that date, when it was nearly four feet above the danger line. The high water caused no damage other than the suspension of travel on the country roads leading into the city.

White river.—Lead Hill, Boone county, Arkansas: more than eight inches of rain fell during the 10th, 11th and 12th. On the 11th the river began to overflow the bottom-lands; it continued to rise during the 12th and 13th, reaching on the latter date a height of two feet above the flood of 1844, and nine feet above the flood of 1873. Many miles of fencing were swept away, houses flooded and cattle drowned.

Alabama river.—Montgomery, Alabama: a very high stage of water was attained on the 20th and 21st, when the lowlands on the northern bank of the river were flooded.

Raritan river.—New Brunswick, Middlesex county, New Jersey: the river rose to a point three feet above high water mark on the 8th. The docks along the river front were submerged, and considerable damage was done to the lumber yards.

James river.—Lynchburg, Virginia: the river rose for several days preceding the 10th, and on that date reached its maximum height. Some inconvenience resulted from the high water, but no damage was done.

Arkansas river.—Little Rock, Arkansas: the river rose rapidly during the 12th, reaching the danger-line at 11 a. m. It continued to rise and on the 14th, several land slides were reported from points along the Fort Smith railroad. The river reached its highest point on the 16th, and fell rapidly on the 18th.

Fort Smith, Arkansas: the river reached the danger-line on the morning of the 12th and on the 13th it was five feet, three inches above the danger line. The Little Rock and Fort Smith, and Saint Louis and San Francisco railroad companies sustained heavy losses by having bridges washed away and the railroad tracks damaged. On the 14th the water was within two feet of the flood of 1844, and six feet above the danger-line.

Red river.—Shreveport, Louisiana: on the 22d, several plantations, both above and below this place, were overflowed. On the 25th, people and stock were brought to this place, by steamer, from the overflowed plantations below. On the 27th, the river reached its highest stage, thirty-two feet and seven inches, which is believed to have been the highest stage since 1849. Silver Lake bottom, near the city, was covered with back-water, and many of the residents of that locality were compelled to leave their homes.

Reports from Fulton, Hempstead county, Arkansas, on the 15th, stated that the river had risen one foot during the preceding twenty-four hours, and that a large area in that vicinity was under water, resulting in the drowning of much stock.

Miscellaneous.—Reports from Sherman, Grayson county, Texas, on the 12th, stated that heavy rains had fallen for several days preceding that date, washing away bridges on the Texas and Pacific railroad at points both east and west of Sherman.

Corsicana, Texas: fully eight inches of rain fell during the three days preceding the 8th. All of the creeks overflowed, and several small bridges on the Texas and Saint Louis railroad, east of Corsicana, were washed away.

Longview, Texas: the heavy rains from the 5th to the 9th flooded the bottom lands and caused many extensive landslides and washouts on the railroads.

Mount Vernon, Knox county, Ohio: during the afternoon of the 6th a bridge over Armstrong river, one mile west, was washed away.

Urbana, Champaign county, Ohio: the Madison bottoms, in the western part of this county, were entirely submerged on the 6th.

San Francisco, California: owing to a heavy rainstorm telegraphic communication with southern California was inter-

rupted for several days after the 17th. Reports from Los Angeles, via Deming and Ogden, on the 20th, stated that a dam on the Los Angeles river broke during the night of the 17-18th, producing the most disastrous flood ever experienced. The lower part of the city was completely inundated and forty buildings were swept away. Hundreds of families were obliged to abandon their homes and seek shelter on the hills. From Los Angeles to Mojave, a distance of one hundred miles, scarcely a mile of the Southern Pacific railroad track remained in place, and from Los Angeles eastward to San Geronio the destruction was equally great. The California Southern railroad, from Colton to San Diego, was also washed out. Reports from towns in the southern part of San Joaquin valley stated that the floods in that section were the heaviest ever experienced.

Reports from San Bernardino, on the 21st, stated that the streets were covered with water to a depth of three feet, and that the houses were flooded. The town of Fall Brook was reported to have been entirely washed away. Many of the inhabitants were missing and were supposed to have been drowned. Numerous orange groves and vineyards in the San Gabriel valley were completely destroyed.

Los Angeles, California: careful estimates of the losses caused by the floods in this county place them at \$750,000, which will be more than compensated by the benefits done to the wheat and fruit crops.

San Buena Ventura, Ventura county, California: on the 5th the Santa Clara river was higher than it had been known to be for years. Several bridges were washed away and, in some places land slides occurred on the railroads. During the storm preceding the freshet 9.60 inches of rain fell.

Santa Anna, Los Angeles county, California: the rains preceding the 5th were the heaviest that have occurred for several years. For the first time in eight years the water in the Santa Anna river ran into the ocean. All of the small streams in that vicinity were much swollen.

Yuma, Arizona: the railroad tracks west of this place were badly washed by the heavy rains of the 3d, causing delay of trains for two days.

HIGH TIDES.

New York City.—The highest tide that has been known for several years occurred on the 28th. When at its maximum height, at about 9.30 a. m., the railroad tracks at the Erie depot in Jersey City were covered with several inches of water. The cellars along the river front, and particularly those on South street, were flooded.

High tides also occurred as follows:

New River Inlet, North Carolina, 7th, 14th, 17th, 28th.

Cape May, New Jersey, 27th.

Cedar Keys, Florida, 27th.

Narragansett Pier, Rhode Island, 26th, 27th.

LOW TIDES.

New York City.—The strong southwesterly winds of the 29th (low area xiv.) caused the lowest tide that has occurred for several years. Many of the larger vessels along East river front were resting on the bottom of the river. Split rock, off Tompkinsville, which is only seen about once in seven years, was two feet out of water. West Bank, near Swinburne Island, was nearly dry and miles of the beach along the south shore and Great Kills were entirely dry. Much inconvenience was experienced by the ferry boats.

Block Island, Rhode Island.—The strong northwesterly gales of the 29th (low area xiv.), caused very low tides.

Low tides were also reported from the following places:

Narragansett Pier, Rhode Island, 29th.

Point Judith, Rhode Island, 29th.

New Haven, Connecticut, 29th.

Cedar Keys, Florida, 20th.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors during February, 1884, with the average depth at which the

observations were made and the mean temperature of the air at the various stations, are given in the table below. The highest water temperatures reported during the month, 74°.8 and 77°.6, were observed at Cedar Keys and Key West, Florida, on the 12th and 19th, respectively, and the lowest, 29°.8, was observed at New Haven, Connecticut, on the 4th.

Temperature of water for February, 1884.

STATION.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.				
Atlantic City, New Jersey.....	42.0	33.0	9.0	ft. 4	in. 1	37.6
Alpena, Michigan.....	62.5	46.5	16.0	10	7	56.5
Augusta, Georgia.....	41.0	33.5	7.5	9	0	42.2
Baltimore, Maryland.....	39.0	30.8	8.2	8	3	35.0
Block Island, Rhode Island.....	33.8	30.2	3.6	22	10	31.0
Boston, Massachusetts.....	48.3	33.4	14.9	17	0	38.2
Buffalo, New York.....	74.8	40.1	28.7	11	5	63.4
Canby, Fort, Washington.....	60.6	50.6	10.0	40	7	58.7
Cedar Keys, Florida.....	47.1	33.5	13.6	4	7	41.9
Charleston, South Carolina.....	40.3	33.4	16.9	8	4	39.9
Chicago, Illinois.....	33.8	32.2	1.6	15	5	24.7
Chincoteague, Virginia.....	66.4	51.2	15.2	12	0	60.4
Cleveland, Ohio.....	32.6	32.1	0.5	19	0	24.8
Detroit, Michigan.....	68.6	51.3	17.3	8	2	60.2
Delaware Breakwater, Delaware.....	66.6	50.0	16.6	18	0	62.1
Duluth, Minnesota.....	77.6	71.1	6.5	17	8	72.5
Eastport, Maine.....	62.0	49.3	12.7	2	8	58.9
Escanaba, Michigan.....	59.5	47.2	12.3	15	4	57.3
Galveston, Texas.....	35.4	29.8	5.6	14	11	31.7
Grand Haven, Michigan.....	37.2	34.5	2.7	12	6	33.6
Indianola, Texas.....	35.0	31.5	3.5	16	0	35.1
Jacksonville, Florida.....	51.0	33.0	18.0	16	10	50.1
Key West, Florida.....	65.1	54.7	10.4	17	4	58.9
Mackinaw City, Michigan.....	33.6	30.2	3.4	17	2	29.7
Macon, Port, North Carolina.....	45.4	33.2	12.2	50	7	36.0
Marquette, Michigan.....	39.9	33.2	6.7	12	9	34.1
Marquette, Wisconsin.....	39.8	35.7	4.1	1	7	35.8
Mobile, Alabama.....	52.3	45.0	7.3	39	0	50.0
New Haven, Connecticut.....	63.8	49.3	14.5	11	2	58.3
New London, Connecticut.....	39.5	50.0	9.5	10	0	54.8
New York City.....	60.0	43.5	16.5	17	7	59.5
Norfolk, Virginia.....						
Penascola, Florida.....						
Portland, Maine.....						
Portland, Oregon.....						
Provincetown, Massachusetts.....						
Sandusky, Ohio.....						
Sandy Hook, New Jersey.....						
San Francisco, California.....						
Savannah, Georgia.....						
Smithville, North Carolina.....						
Toledo, Ohio.....						
Wilmington, North Carolina.....						

* Frozen entire month.

† Observations interrupted by ice from 1st to 11th, 14th, 15th, 17th, 18th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for February 1884, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 83.36 per cent. The percentages for the four elements are: weather, 89.40; direction of the wind, 78.48; temperature, 80.84; barometer, 84.53 per cent. By geographical districts they are: for New England, 88.29; middle Atlantic states, 87.13; south Atlantic states, 84.22; eastern Gulf states, 83.04; western Gulf states, 80.46; lower lake region, 86.48; upper lake region, 83.87; Ohio valley and Tennessee, 82.73; upper Mississippi valley, 82.01; Missouri valley, 74.93; north Pacific coast region, 78.12; middle Pacific coast region, 100.0; south Pacific coast region, 81.25. There were eighty-one omissions to predict, out of 3,504 or 2.31 per cent. Of the 3,423 predictions that have been made, one hundred and fifteen, or 3.36 per cent., are considered to have entirely failed; one hundred and thirty-four, or 3.91 per cent., were one-fourth verified; four hundred and twenty-six, or 12.45 per cent., were one-half verified; five hundred and sixty-four, or 16.48 per cent., were three-fourths verified; 2,184, or 63.80 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

Reports from the districts on the Pacific coast were discontinued on the 10th, consequently no predictions for those districts were made after that date.

CAUTIONARY SIGNALS.

During February, 1884, one hundred and seventy-six caution-

any signals were ordered. Of these, one hundred and fifty-three, or 86.93 per cent., were justified by winds of twenty-five miles or more, per hour, at or within one hundred miles of the station. One hundred and seven cautionary off-shore signals were ordered, of which number, one hundred, or 93.46 per cent., were fully justified both as to direction and velocity; one hundred and five, or 98.13 per cent., were justified as to direction; and one hundred and two, or 95.32 per cent., were justified as to velocity. There were no "northwest" signals ordered at the lake ports during the month. Two hundred and eighty-three signals of all kinds were ordered, of which two hundred and fifty-three, or 89.40 per cent., were fully justified. These do not include signals ordered at display stations where the wind velocities are only estimated. Four signals were ordered late. Of the one hundred and seven cautionary off-shore signals that were ordered, seventy-nine were changed from cautionary signals. In eighty cases, winds of twenty-five miles or more, per hour, were reported for which no signals were ordered.

Professor T. C. Mendenhall, director of the "Ohio Meteorological Bureau," in his report for February states:

During the month of February a much more extensive system of verifications of railway signals has been established. Thirteen observers along the line of the Cleveland, Mount Vernon and Delaware railway, are now co-operating with the bureau in this matter. The result for the month was, that in temperature, the predictions of the signals displayed, show a percentage of verification of 93 per cent., and in the "state of the weather," the percentage was 84.

The signals above referred to consist of colored symbols displayed from the sides of the baggage cars, representing the daily forecasts, as telegraphed at midnight from the office of the Chief Signal Officer to said bureau.

ATMOSPHERIC ELECTRICITY.

AURORAS.

An auroral display occurred on the night of the 1-2d, which has been reported by the following stations:

Eastport, Maine: a faint aurora was observed from 9 p. m. until the early morning.

Portland, Maine: a faint display was visible from 11.15 p. m. until midnight.

Gardiner, Maine: an aurora was visible from 11 p. m. until 1.45 a. m.

Point Judith, Rhode Island: a faint auroral arch of pale yellowish color was visible from 11 p. m. until 4 a. m.

Boston, Massachusetts: an aurora was suspected from 2.40 a. m. until daylight, the sky being obscured by clouds.

Fort Totten, Dakota: an aurora was visible from 7.30 to 9.10 p. m., consisting of a pale light resembling the morning dawn. The telegraph line between this place and Larimore, Dakota, was so influenced during the display as to render communication impossible.

Other displays were reported as follows:

A faint auroral display was observed at Woodstock, Maryland, at 7.45 p. m. of the 2d.

At Fort Maginnis, Montana, a faint auroral display was observed at 9.10 p. m. of the 14th. A display was also seen on this date at Sandwich, Illinois.

On the night of the 19-20th, an auroral display was observed at Smithville and New River Inlet, North Carolina. This display was reported by these stations only. At Smithville, it appeared at 6.20 p. m., and continued until 7.40 p. m., when the sky became entirely obscured by clouds. The aurora was first observed in the northwestern sky, consisting of a narrow streak of whitish light without any visible movement, and extending upward 12° or 15° from the horizon. This appearance gradually faded when a light appeared in the north, red near the horizon and straw-colored from the centre to its uppermost limit, which was about 25° above the horizon. The display attained its maximum brilliancy and extent at about 7 p. m. and, afterwards, gradually faded away, leaving only a faint glow at 7.30 p. m. At New River Inlet, this display

was reported to have been observed from 6.54 to 7.30 p. m., consisting of occasional flashes of pale yellow light.

A faint display was also seen at Smithville and New River Inlet on the 22d. At Smithville it consisted of a bright, straw-colored light, and was visible from 6.45 until 7.20 p. m. At New River Inlet it was reported to have been of a very faint yellowish color, and was observed from 6.59 until 7.55 p. m. Auroral displays were also observed on the 22d, at Swartz creek, Michigan, and Sandwich, Illinois, the observers at the latter stations not stating the time at which the displays occurred.

On the 23d faint auroral displays were seen at Gardiner, Maine, Fort Brady, Michigan, and Saint Vincent, Minnesota. At the last-named stations it was observed from 8.15 to 9.30 p. m., in the form of an arch extending over about 30° of the horizon, and to an altitude of 10° .

At 12.45 a. m., of the 25th, a faint display was observed at Gardiner, Maine.

The most widely observed display of the month occurred on the 29th. It was observed at stations both on the Atlantic and Pacific coasts, although it was not reported from stations between the upper lake region and eastern Washington Territory. In New England the display was faint, lasting from the early evening hours until midnight.

At Sandusky, Ohio, it was reported as a faint light lasting from 9.30 p. m., until midnight.

In the upper lake region the display was very brilliant. At Escanaba, Michigan, it was observed from 7.50 p. m. until after midnight, attaining its greatest brilliancy between 9.25 and 10.40 p. m., when an arch of yellow light extended from east to west and to within 8° of the zenith. At 10.15 p. m. "merry dancers" and two distinct arches were visible. Towards midnight the display became less brilliant.

At Mackinaw City the display was first observed at 9.10 p. m., when numerous streamers of various colors were seen moving across the northern horizon. At 10.40 p. m. it disappeared. At Alpena, Michigan, it was reported as consisting of brilliant streamers, shooting upward from a dark segment on the horizon, and having an apparent motion from the east. The display continued until 2.30 a. m. of March 1st. At Marquette, Michigan, the display was faint, appearing first at 7.45 p. m., fading away at 8.20, reappearing at 10.10, and finally disappearing at 11.20 p. m.

The observer at Port Angeles, Washington Territory, reports as follows: an aurora was observed at 7.45 p. m., with dark segment resting upon the northern horizon, above which was an arc of yellowish color. The display extended over about 50° of the northern sky and to an altitude of 15° ; at 10.30 p. m. it disappeared. At Pysht, Washington Territory, the aurora was observed from 8 to 11 p. m.

ELECTRICAL PHENOMENA.

Fort Maginnis, Montana.—The telegraph lines were affected by atmospheric electricity on the afternoon of the 19th.

THUNDER-STORMS.

Thunder storms were reported in the various districts on the following dates:

New England.—11th, 14th, 16th, 17th, 20th, 23d.

Middle Atlantic states.—7th, 13th to 16th, 18th, 19th, 20th, 22d, 23d, 28th.

South Atlantic states.—1st, 2d, 12th, 13th, 14th, 16th to 20th, 22d, 23d, 25th, 27th.

Florida peninsula.—12th to 17th, 19th, 22d, 25th.

Eastern Gulf states.—1st, 12th, 13th, 16th, 17th, 19th, 22d.

Western Gulf states.—4th, 5th, 7th, 8th, 11th, 12th, 13th, 17th, 18th, 19th, 22d, 26th, 27th.

Rio Grande valley.—Rio Grande City, 11th.

Tennessee.—1st, 4th, 5th, 12th, 13th, 19th, 22d, 27th.

Ohio valley.—4th, 5th, 6th, 12th, 17th, 18th, 19th.

Lower lake region.—4th, 5th, 19th.

Upper lake region.—12th, 19th.

Upper Mississippi valley.—4th to 7th, 12th, 17th, 19th.

Missouri valley.—3d, 4th, 12th, 18th.

Middle slope.—8th, 10th, 11th, 12th, 29th.

North Pacific coast region.—Astoria, Oregon, 4th, 8th, 9th, 17th, 18th, 19th.

South Pacific coast region.—Yuma, Arizona, 3d.

At Austin, Texas, a severe thunder-storm occurred on the night of the 11-12th, during which the University building was struck by lightning and damaged to a considerable extent.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England.—2d, 3d, 10th, 11th, 15th, 16th, 19th, 21st, 22d, 27th.

Middle Atlantic states.—3d, 4th, 6th, 12th, 13th, 16th, 22d, 27th.

South Atlantic states.—1st, 2d, 6th, 8th, 20th, 23d, 26th to 29th.

Tennessee.—2d, 5th, 11th, 12th, 14th, 15th, 18th, 21st, 22d, 26th.

Ohio valley.—1st, 16th, 21st, 26th.

Lower lake region.—1st, 16th, 19th, 21st, 29th.

Upper lake region.—1st, 3d, 5th, 6th, 8th, 10th, 11th, 20th, 21st, 27th, 28th.

Extreme northwest.—5th, 6th, 12th, 15th, 19th.

Upper Mississippi valley.—10th, 15th, 18th to 23d, 25th, 26th, 27th.

Missouri valley.—3d, 6th, 12th, 13th, 15th, 19th to 22d, 25th, 27th.

Middle slope.—15th, 18th, 20th, 29th.

Middle Pacific coast region.—8th, 9th, 10th, 13th, 17th, 19th, 20th, 22d, 24th.

Solar halos were also observed at the following stations not included in the districts named above:

Fort Grant, Arizona, 14th.

Deadwood, Dakota, 6th.

Boisé City, Idaho, 25th.

Nephi, Utah, 27th.

Salt Lake City, Utah, 10th.

Spokane Falls, Washington Territory, 20th.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England.—3d, 5th, 7th, 8th, 10th, 14th, 15th, 19th.

Middle Atlantic states.—3d, 5th, 6th, 7th, 10th, 13th, 15th, 16th.

South Atlantic states.—2d, 4th to 8th, 12th.

Florida peninsula.—1st, 6th.

Eastern Gulf states.—7th, 8th, 10th.

Western Gulf states.—1st, 2d, 4th, 15th, 24th.

Rio Grande valley.—5th, 6th, 9th, 19th.

Tennessee.—4th, 5th, 15th, 16th, 22d.

Ohio valley.—1st to 4th, 16th, 19th, 23d, 25th.

Lower lake region.—7th, 10th.

Upper lake region.—2d, 5th, 6th, 7th, 9th, 10th.

Extreme northwest.—5th, 6th, 7th, 9th, 10th, 11th, 14th.

Upper Mississippi valley.—2d, 4th, 5th, 9th, 13th, 20th.

Missouri valley.—1st, 2d, 3d, 6th, 9th, 11th, 12th, 22d.

Northern slope.—1st, 5th, 6th, 8th, 9th.

Middle slope.—2d, 4th, 6th, 9th, 15th, 16th, 18th.

Southern slope.—4th, 8th, 10th.

Middle plateau.—5th, 8th, 12th, 13th.

Northern plateau.—5th, 9th, 10th.

Middle Pacific coast region.—2d, 3d, 4th, 6th, 9th, 10th, 13th.

Lunar halos were also observed at the following stations not included in the districts named above:

Prescott, Arizona, 9th.

Olympia, Washington Territory, 16th.

Port Angeles, Washington Territory, 7th.

MIRAGE.

Fort Maginnis, Montana.—During the afternoon of the 15th

many points along the Yellowstone river in the southwest, and not ordinarily visible, were plainly seen. On the 17th, during the afternoon, the whole southern and eastern portions of the country appeared to be elevated above their natural positions.

Mirage was also observed at the following places during the month:

College City, California, 9th, 12th.

Vermillion, Dakota, 9th, 24th.

Alexandria, Dakota, 9th, 24th, 28th.

Saint George's, Delaware, 19th.

Larchland, Illinois, 2d, 14th.

Pretty Prairie, Kansas, 1st, 2d.

Genoa, Nebraska, 9th, 13th, 14th.

Indianola, Texas, 15th, 17th, 25th, 28th.

MISCELLANEOUS PHENOMENA.

The peculiar appearance of the sky at sunrise and sunset, which has been observed for several months past, continued, but with diminished brilliancy, during February. The reports for February are much less numerous than those received during the previous months, and show that the phenomenon is becoming less noticeable, although, in some instances, the displays were reported to have been very brilliant.

The phenomenon was observed in the several states and territories, as follows:

Alabama.—Green Springs, 5th, at sunrise; 21st, at sunset. Auburn, on all clear days of the month.

Arkansas.—Fayetteville, 24th, at sunset.

California.—Hydesville, 3d, 7th, 9th, 13th, 20th, 22d to 27th, at sunrise, and on 2d, 7th, 12th, 12th, 20th, 22d to 28th, at sunset. Point Lobos, 25th, 26th, 27th, at sunset. Cape Mendocino, 23d, 25th, 26th, at sunset.

Colorado.—Golden, 28th, at sunset. On the summit of Pike's Peak on 22d, a dim, red light resembling the sunset glow, appeared in the southwest at 6.30 p. m., and continued for thirty minutes.

Dakota.—Alexandria, 1st, 8th, at sunset, and 9th, 14th, 15th, at sunrise. Vermillion, the sunset after-glow steadily diminished in brilliancy during the month. The observer at Webster reports that the sunsets during February were more noticeable than any previously observed; they were noted on the 1st, 6th to 9th, 19th, 20th, 22d, 24th; those of 6th and 20th, being remarkably brilliant; on the 9th the sky at sunrise was of the same appearance.

Florida.—Archer, 21st at sunrise, and 22d, 23d, and 27th at sunset. Limona, 24th, 29th, sunrise, and 23d at sunset. Newport, 1st, 2d, 4th, 5th, 20th, 21st, 22d, 25th, both before sunrise and after sunset. Jacksonville, 23d, very brilliant both after sunset and before sunrise.

Georgia.—Andersonville, 27th at sunset.

Idaho.—Boisé City, the remarkable redness in the western sky after sunset continued during February.

Illinois.—Cairo, 19th at sunset. Swanwick, bright sunrises and sunsets continued during February.

Indiana.—Vevay, 1st, 2d, 3d, 19th, 29th at sunrise. Sunman, 19th, 21st at sunrise and 20th at sunset.

Iowa.—Muscatine, 2d, 14th, 20th at sunset, and 20th, 21st at sunrise. Cedar Rapids, 14th at sunrise.

Kansas.—Wellington, red sunsets were observed on all clear days of the month, but were not so brilliant as those seen during the previous months. Fort Scott, the red sunsets of February were not so brilliant as those of January.

Maine.—Cornish, 15th, at sunset.

Maryland.—Baltimore, 2d, at sunset.

Massachusetts.—Taunton, 15th, at sunset, very brilliant.

Nebraska.—Clear Creek, 1st, 2d, 7th, 8th, 12th, 13th, 19th, 20th, 22d, at sunset. Red Willow, 27th, 28th, at sunrise.

Nevada.—Carson City, 29th, the red sunsets still continue.

New Hampshire.—Summit of Mount Washington, 10th, 15th, 16th, at sunset, and the 16th at sunrise.

New York.—North Volney, 21st, at sunrise.

North Carolina.—Brevard, 21st, at sunset.

Ohio.—College Hill, 1st, 2d, at both sunrise and sunset.

Oregon.—Albany, 25th, at sunset.

Pennsylvania.—Fallsington, 21st, at sunset.

Tennessee.—Knoxville, at about one hour before sunrise on the 11th, a dense fog prevailed which presented a very peculiar appearance—being of a deep red color which appeared equally brilliant in all directions. Nashville, sunset glows on 1st, 2d. Hardison's Mills, 5th, 12th, 15th, 24th, at sunrise. Manchester, Grief, and Alexandria, on 11th, at sunrise. Hardison's Mills, 4th, 20th, 21st, at sunset. Parksville, Hurricane Switch, Grief, and Alexandria, on the 15th, at sunset.

Texas.—Cleburne, 24th, 25th, at sunrise.

Vermont.—Strafford, 1st, 16th, at sunset, and 17th at sunrise.

Washington Territory.—Bainbridge island, 5th, 6th, 7th, 11th, 12th, 13th, 26th to 29th, at sunset. Olympia, 28th, at sunset.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for February, 1884:

Date— Feb., 1884.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 9 a. m.	3	20½					7	50½	Faculae abundant.
2, 10 a. m.	0	0	0	5½	0	0	7	45½	
3, 12 m.	1	25½	2	12½	1	2	6	60½	
10, 2 p. m.	3	10½					7	25½	
15, 2 p. m.							0	35½	
16, 10 a. m.	1	2	1	1	1	2	6	35½	
20, 2 p. m.							5	30½	
21, 12 m.	1	2	1	3	1	2	5	30½	
22, 1 p. m.	0	0	1	2	0	0	4	25½	
24, 12 m.	2	10½	0	5½	2	10½	6	30½	
25, 3 p. m.	1	15½	0	0	1	5½	7	45½	

Faculae were seen at the time of every observation. †Approximated.

Mr. H. D. Govey, of North Lewisburg, Ohio, reports that sun-spots were observed on all clear days during the month.

SUNSETS.

The characteristics of the sky as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service stations. Reports from one hundred and fifty-four stations show 4,271 observations to have been made, of which six were reported doubtful; of the remainder, 4,265, there were 3,787, or 88.8 per cent., followed by the expected weather.

EARTHQUAKE.

The following communication was published in the Saint Louis "Globe-Democrat," of February 20, 1884:

To the editor of the "Globe-Democrat":

CALEDONIA, MISSOURI, February 19, 1884.—I have seen no mention in the public prints of a slight earthquake shock that was felt at this point on Friday, the 15th instant. About 6 a. m. of that day, before I had risen, I felt the house shaking as if there had been a heavy clap of thunder, the shingles rattled on the roof, and the walls creaked under the strain. As this continued two or three seconds, I had time to find out that it was not thunder, nor any concussion inside the house; so, concluding that it was an earthquake, I prepared to observe its phenomena, but the shock was over before I could record any very marked features of its movement. The heaving motion of the earth was very perceptible, however, and the character of the shock was at once suspected by all who felt it. It was felt at a point four miles south of this, but seems to have occasioned little comment. Those who were in the second stories of houses felt the shock more perceptibly than those on the ground floors. Very truly,

R. F. CHEW.

METEORS.

Captain Morgan, of the British s. s. "Egyptian Monarch," which arrived at New York, February 25th, from London, states that on February 12th (near N. 49° 30', W. 15° 0'), about 10 a. m., a meteor burst over his vessel, apparently about ten feet above the bridge, giving a terrific report and strong sulphurous smell.

Yuma, Arizona.—A meteor was observed in the southwestern sky at 4.28 a. m. of the 24th, and left a bright trail.

Clarksville, Red River county, Texas.—A large meteor was observed at 4. m. of the 25th, passing in a direction from southwest to northeast and exploding with a loud report when near the earth.

Meteors were also observed on the several dates, as follows: 1st.—Vermillion, Dakota; Crete, Nebraska.

14th.—Davenport, Iowa.

20th.—Woodstock, Maryland; Austin, Texas; Variety Mills, Virginia.

21st.—Woodstock, Maryland; Menand Station (near Albany), New York.

22d.—Allison, Kansas; Davenport, Iowa.

25th.—Red Willow, Nebraska.

28th.—Auburn, Alabama.

ZODIACAL LIGHT.

Prescott, Arizona, 20th, 21st, 22d, 27th, 28th, 29th.

Archer, Florida, 2d, 26th.

Cresco, Iowa, 16th.

Allison, Kansas, 20th, 22d, 24th.

Yates Centre, Kansas, 19th, 20th, 24th, 25th, 28th.

Cambridge, Massachusetts, 15th, 20th, 24th.

Somerset, Massachusetts, 15th, 16th, 20th, 29th.

Mazatlan, Mexico, 28th.

Escanaba, Michigan, 1st, 7th, 20th, 23d.

Syracuse, New York, 21st.

Chapel Hill, North Carolina, 20th, 23d, 28th.

Albany, Oregon, 27th.

Stateburg, South Carolina, 18th, 21st, 28th.

Nashville, Tennessee, 15th, 18th, 25th.

Variety Mills, Virginia, 15th, 18th, 20th, 21st, 24th, 25th, 26th, 28th.

Sussex, Wisconsin, 21st.

POLAR BANDS.

Lead Hill, Arkansas, 14th, 18th, 19th, 20th.

Archer, Florida, 2d, 15th, 23d, 28th, 29th.

Riley, Illinois, 15th.

Guttenberg, Iowa, 24th.

Yates Centre, Kansas, 1st, 20th.

Portland, Maine, 21st.

Escanaba, Michigan, 10th.

Clear Creek, Nebraska, 20th, 21st.

Johnson, Nebraska, 29th.

Moorestown, New Jersey, 14th.

Rochester, New York, 16th.

Wauseon, Ohio, 3d, 14th, 16th, 29th.

Troy, Pennsylvania, 14th.

Block Island, Rhode Island, 3d.

Nashville, Tennessee, 25th.

Rio Grande City, Texas, 13th, 18th.

Wytheville, Virginia, 5th.

MIGRATION OF BIRDS.

Geese flying northward.—Swanwick, Illinois, 2d; Elk Falls, Kansas, 7th, 20th; Holton, Kansas, 1st; Leavenworth, Kansas, 23d, 24th; West Leavenworth, Kansas, 22d; Yates Centre, Kansas, 23d; Liberty Hill, Louisiana, 5th; Shreveport, Louisiana, 26th; Clear Creek, Nebraska, 2d, 24th, 26th; Garrettsville, Ohio, 19th; Troy, Pennsylvania, 25th; Ashwood, Tennessee, 11th; Fort Myer, Virginia, 22d; Variety Mills, Virginia, 11th. *Flying southward.*—Edgington, Illinois, 25th; New River Inlet, North Carolina, 14th; Fort Myer, Virginia, 25th; Cape Henry, Virginia, 19th. *Flying westward.*—Griffin Station, Indiana, 12th; West Leavenworth, Kansas, 22d. Geese appeared at Golden, Colorado, on the 18th.

Ducks flying northward.—Fort Smith, Arkansas, 17th; Swanwick, Illinois, 2d; Griffin Station, Indiana, 9th; Yates Centre, Kansas, 3d, 25th; Fort Scott, Kansas, 13th; Clear Creek, Nebraska, 26th; Moorestown, New Jersey, 16th; Chambersburg, Pennsylvania, 22d; Narragansett Pier, Rhode Island, 19th; Indianola, Texas, 1st. *Flying southward.*—Fort Smith, Arkansas, 19th; Red Willow, Nebraska, 23d; Oswego, New York, 24th. *Flying eastward.*—Yates Centre, Kansas, 23d.

Flying westward.—Griffin Station, Indiana, 12th; Guttenburg, Iowa, 11th, 26th; Yates Centre, Kansas, 24th.

Brents flying northward.—Indianola, Texas, 1st; West Leavenworth, Kansas, 26th.

PRAIRIE AND FOREST FIRES.

Galveston, Texas.—Reports from Temple, Bell county, state that on the morning of the 23d an extensive fire was raging among the cedars at the falls on Leon river, which threatened to destroy the greater part of the timber in that section.

Limona, Hillsborough county, Florida.—From the 7th to 10th the atmosphere was filled with smoke from forest fires. Much fencing and grass and many trees were destroyed.

Andersonville, Sumter county, Georgia.—On the 11th the atmosphere was filled with smoke from forest fires.

Fort Smith, Arkansas, 29th.

Cedar Keys, Florida, 10th.

Cantonment, Indian Territory, 28th.

Fort Stockton, Texas, 17th, 18th, 26th.

Indianola, Texas, 15th, 24th, 25th, 26th.

DROUGHT.

Reports from Pensacola, Florida, on the 13th, stated that rain was much needed in that vicinity. The interests most affected by the drought were those of the lumber dealers, who were unable to float their stocks of logs to the Gulf on account of the low stage of water in the neighboring streams.

WATER SPOUT.

On February 19th the schooner "Three Sisters," in N. 32° 52', W. 78° 54', was struck by a water spout which carried away main-gaff, mainsail, foresail, and mast-hoops, and flattened the after hatches.

NOTES AND EXTRACTS.

REPORT OF THE MISSOURI WEATHER SERVICE, FEBRUARY, 1884.

The mean temperature during February has been 34.6 at the Central Station, which is eight tenths of a degree below the average temperature of Saint Louis. In the last forty-seven years February has been colder than in the month of February last, eighteen times; the coldest February, that of 1838, being 20.7, or 13.9 degrees below that of February, 1884.

The lowest temperature reached during the month was 3° 0 at the Central Station. This has been exceeded many times in previous years. On February 3d, 1856, the temperature fell to -15°, and the next day it was -11°. The temperature has fallen to zero as late as March 3d (1848), and to 1° 0 as late as March 14th (in 1867). The opinion generally entertained that the weather of last month was unusually severe is always produced by normal winter weather.

In the state the lowest temperatures have been observed in the southern and western parts. The lowest were -12° at Phelps City; -8° at Oregon, -6° at Savannah; -5° at Carthage and Centreville. The lowest at Keokuk was 2°; at Saint Louis 3°; Mascoutah, Illinois 6°; and Cairo, Illinois 12°.

The rainfall has been heaviest (over six inches) in a narrow belt stretching southward from Centreville. From this area the fall diminishes with great regularity to one inch in the northwest part of the state. The rainfall at Saint Louis has been 3.88 inches, or 1.3 inches above the average. The principal rainfall of the month fell on the fourth and twelfth of the month and was accompanied with heavy thunder. The rivers in southern Missouri were all high during the middle of the month, and this aided in the destruction caused by the floods in the lower Mississippi.

The floods caused greatest destruction along the Ohio river, where the water was higher than ever before observed, as far down as Mound City. At Cairo, seven miles below Mound City, the water was half an inch below the high-water of 1882, and four inches below that of 1883.

The following notes are taken from the station reports:

Centreville: 5th, first thunder storm of the season last night; 19th, barometer down to 28.7, looks like a storm.

Glasgow: 19th, a strange day; at 7 warm and muddy, temperature 33°; at 9 snowing and freezing; at 12 frozen hard, temperature 18°; 14 hours, sun shining; 16 hours, clear.

Chamois: from 2 hours on the 4th to 22.30 hours on the 5th, 2.77 inches of rain fell; heavy thunder and rain on the 4th; 19th, from 7 to 14 hours the temperature fell 33 degrees.

Louisiana: 19th, temperature fell 20 degrees in two hours, this fall being preceded by a thunder storm at 8.30.

Depth of snow at the end of the month: Phelps City, nw.; Harrisonville, w.; Greenfield, sw.; Ironton, se.; Saint Louis, e.; Mexico, e., and Macon, ne.; none. In the central part of the state, Chamois reports 2 inches, Lexington 0.5, Boonville 2, and Centreville, se., 0.3. Note.—The abbreviations (nw., &c.) indicate the section of the state in which the station is located.

The snow fall was 6.5 inches at Oregon and Ironton; 5.8 at Chamois; 4.7 at Boonville; 3.5 at Macon and Lexington; 3 at Greenfield; 2 at Louisiana; 1.5 at Glasgow; and 1.2 at Miami and Harrisonville.

Robins appeared at Oregon on the 25th, and cat birds at Centreville on the 28th. The witch hazel was observed in bloom at Centreville on the 23d, and the first crocus bloomed on the 28th.

FRANCIS E. NIPHER, Director.

Washington University, March 10, 1884.

The following extract is taken from the February report of the "Tennessee Weather Service," Hon. A. J. McWhirter, director:

The meteorological conditions of the month were, taken altogether, rather anomalous. The most noted features were the storm of the 19th, the cold wave and low range of temperature on the 29th, and the continued cloudy and rainy weather, making, on the whole, perhaps the most gloomy and disagreeable February on record.

The average precipitation was 8.45 inches, or 1.90 inches greater than that of the previous month, and was considerably in excess of the February mean for a number of years. A small portion of this was in snow, and in hail in some localities. The rainfall was pretty well distributed throughout the month, and there was not more than one day absolutely free from rain or snow. The heaviest fall occurred from the 5th to the 10th, inclusive, the 13th, 19th, and 27th. The day on which the greatest quantity fell was the 7th, when the fall averaged 1.38 inches for the state. The mean depth of snowfall was 3.22 inches. The heaviest fall occurred on the 27th. One or two slight falls occurred previous.

The mean temperature was 45°, or 15° 55 above the mean for January. The highest temperature was about the 11-13th, the maximum being 74°, reported from Knoxville, and was the same as the January maximum. The lowest temperature was on the 29th, and was uniform. At one station, Beech Grove, as low as 6° below zero was reported.

The feature of the month was the storm that passed over the state on the 19th. This was severe at Dyersburg, Trenton, Milan, McKenzie, Huntingdon, Waverly, Savannah, Sailor's Rest, Franklin, Ashwood, Hurricane Switch, Hardison's Mills, Florence Station, Flat Creek, Alexandria, Riddleton, Smithville, Fostoria, and Grief. It was particularly severe in the vicinity of Clarksville, where the destruction to houses, fences, and timber was very great. It was also destructive in some of the central counties of the middle division. The course of the storm was from the southwest, the wind changing in a few minutes from south to southwest, west and northwest to north, and followed by a rapid fall in temperature. The wind was accompanied by hail in many places, and snow in some. There was also quite a severe storm of wind and rain on the 12th at Huntingdon, McKenzie, and Parkville; one on the 13th at Grief, Maryville, and Hardison's Mills, and one on the 14th at Flippin and Andersonville. These were destructive to fencing and timber.

The Commissioner again urges upon voluntary observers the importance of making their records full and complete. This is especially requested in the item of daily rainfall, in order to make the table of precipitation accurate. It is to be a feature of future reports, and it is earnestly desired that it shall be a record of reliable data.

The following extract is taken from the report of Prof. T. C. Mendenhall, director of the "Ohio Meteorological Bureau:"

The mean temperature for the month was more than three degrees higher this year than last, and the minimum was not as low by about four degrees, nor was the maximum as high by about six degrees.

While the range for the month was thus considerably smaller than for February of last year, the mean daily range was almost exactly the same. In fact, in the matter of temperature, the month differed but little from the corresponding period of last year.

Unfortunately the similarity did not exist in temperature alone, but in rainfall the extraordinary conditions of February last year were closely repeated and, indeed, somewhat exceeded. Although the mean rainfall for the whole state was somewhat less than that of February, 1883, being 5.52 inches against 6.49 inches for that month, the precipitation in the southern portion of the state was greater than at that time. Thus at Cincinnati the rainfall in February, 1883, was 8.22 inches, while during February, 1884, it was 8.87 inches.

The minimum rainfall observed for the month in 1883 was 4.10 inches at Sandusky, while for the same month in 1884 it was 3.03 inches in Toledo. The heavy precipitation was more localized in 1884 than in 1883. The existence of a large amount of snow, covering a frozen soil, conspired with this heavy rainfall to bring about a repetition of the disastrous floods of last year, those of the present year, however, far exceeding the floods of 1883 in magnitude and in the destruction of property. At Cincinnati the Ohio river reached its highest point on February 14, the gauge showing 71 feet, $\frac{1}{4}$ inch, and it is worthy of note that the maximum was reached on the day following the anniversary of the maximum of last year.

The overflow of the upper Ohio was much greater this year than last. In foot-notes to some of the station reports will be found recorded the dates on which the river reached its maximum stage.

In this connection it will be interesting to note the rainfall as recorded at the seven stations nearest the Ohio river. The records were as follows:

Cincinnati, 8.87 inches; Dayton, 5.67; Washington C. H., 6.32; Waverly, 6.65; Logan, 7.52; Marietta, 5.31; Quaker City, 8.19; Ironton, 5.47.

It will be observed that all are considerably above the mean of the state, except Marietta and Ironton, which were slightly below, and all more than double the normal amount for February, which is 2.51 inches.

INDIANA WEATHER SERVICE.

Monthly summary of meteorological observations for February, 1884, made at Purdue University, La Fayette, Indiana; also a review of the State Volunteer Weather Service, by W. H. Ragan, director.

Latitude 40° 27' north, longitude 9° 54' west of Washington; altitude above sea-level, 661 feet.

	Day of month.	At Purdue University.	Day of month.	In the state.
Barometer—Inches.				
Maximum height.....	15	30.526	15	30.550
Minimum height.....	19	29.412	19	29.020
Mean height.....		30.060		30.059
Monthly range.....		1.114		1.530
Thermometer—degrees.				
Maximum height.....	12	60.0	12	68.0
Minimum height.....	29	-4.0	29	-8.0
Greatest daily range.....	1	31.0	19	32.0
Least daily range.....	11	1.0	7	0.0
Mean of warmest day.....	17	46.7	12	61.5
Mean of coldest day.....	28	6.0	29	3.5
Monthly range.....		64.0		76.0
Monthly mean.....		29.5		32.4
Precipitation—Inches.				
Greatest on any day.....	12	1.39	6	3.50
Maximum.....		5.08		10.80
Minimum.....				2.50
Mean.....				5.17
Wind—miles traveled.				
Maximum velocity.....	19	32	19	60.0
Mean hour velocity.....		10.30		
Total miles for month.....		7,212		

Comments.—The average February barometric pressure, observed at Purdue University for a period of five years, is 30.206 inches, or .116 of an inch above the mean pressure for February, 1884. The highest pressure during this period, 30.789 inches, was on February 4, 1881; the lowest, 29.359 inches, was on February 28, 1882.

The average February temperature for a period of five years is 30° 6, or 1° 1 above the mean for February, 1884. The highest temperature during this period, 66°, was on February 16, 1883; the lowest, -6°, was on February 1, 1883. The warmest month, 37° 9, was February, 1882; the coldest, 24° 9, was February, 1881. The warmest day, 57° 2, was February 12, 1882; the coldest, 3° 7, was February 5, 1883. The greatest monthly range of temperature, 72°, was for February, 1883; the least, 46°, was for February, 1882.

The average February precipitation for a period of five years is 5.04 inches, or .04 of an inch below the mean for February, 1884. The greatest monthly precipitation, 7.46 inches, was for February, 1883; the least, 2.49 inches, was for February, 1880. The greatest precipitation on any one day, 2.95 inches, was February 3, 1883.

The average February wind, for a period of five years is 6,775 miles, or 437 miles less than that of February, 1884. The greatest number of miles of wind for any day during this period, 920, was on February 21, 1882. The greatest miles of wind during any month, 7,602, was for February, 1881; the least, 6,283, for February, 1883. The prevailing wind for February, 1880 and 1883, was from the southwest; for 1881, from the east; for 1882, from the south; and for 1884, from the northeast.

For the state the highest barometer is reported from Switzerland county; the lowest from Vanderburg county. The highest temperature is reported from Washington and Crawford counties; the lowest from Montgomery county. The greatest daily range of temperature is reported from Wabash and Clinton counties; the least from Wabash county. The warmest day is reported from Washington county; the coldest from Allen and Wabash counties. The greatest precipitation on any day is reported from Switzerland county. The greatest precipitation for the month is reported from Crawford county; the least from Montgomery county. The maximum velocity of wind is reported from Switzerland county.

The average maximum temperature in the southern portion of the state is 66°, for the central portion of the state 61°, and for the northern portion of the state 55°. The average minimum temperature in the southern portion of the state is 3° 0, for the central portion -2° 1, and for the northern por-

tion -2° 5. The average temperature for the southern portion of the state is 36°, for the central portion 31° 6, and for the northern portion 29° 7. The average precipitation for the southern portion of the state is 6.78 inches, for the central portion 4.48 inches, and for the northern portion 4.25 inches.

WEATHER REPORT FOR FEBRUARY, 1884.

Prepared by Prof. F. H. Snow, of University of Kansas, from observations taken at Lawrence.

This month, although nearly five degrees colder than the February average, has been exceeded in average coldness by four Februaries in the past sixteen years, in 1874, 1875, 1881, and 1883. The minimum temperature, however, was high, having been lower in ten of the preceding Februaries. The rainfall and the humidity were nearly normal, the cloudiness was excessive, and the wind velocity was considerably above the average. The peculiar sunset after-glow of the preceding months was occasionally observed, but had apparently disappeared before the end of the month.

The following table furnishes a comparison with the sixteen preceding Februaries:

February.	Mean temperature.	Maximum temperature.	Minimum temperature.	Winter days.	Zero days.	Rain (inches).	Snow (inches).	Rainy days.	Thunder-storms.	Mean cloudiness.	Humidity.	Number of fogs.	Miles of wind.	Mean barometer.	Maximum barometer.	Minimum barometer.
1868.....	35.71	72.0	0	13	1	0.19	6.50	3	1	24.71	0	0	29.097	29.623	28.636	
1869.....	30.63	66.0	5.0	15	1	1.44	5.25	0	1	51.20	83.1	4	29.047	29.572	28.337	
1870.....	35.42	69.0	4.0	9	1	0.03	0.00	2	0	43.69	61.6	2	29.039	29.610	28.333	
1871.....	35.30	71.5	6.0	9	1	2.43	4.00	2	0	49.85	74.3	3	29.048	29.588	28.419	
1872.....	30.44	62.0	12.0	10	3	0.82	7.75	3	1	54.91	78.4	3	29.045	29.727	28.575	
1873.....	30.22	62.0	6.5	13	2	0.85	3.00	3	1	45.95	68.1	1	29.102	29.699	28.300	
1874.....	27.05	49.0	2.0	10	0	0.05	10.00	2	1	60.94	78.2	4	29.166	29.699	28.594	
1875.....	21.92	35.0	8.0	23	3	0.80	4.00	7	1	50.48	74.7	1	29.174	29.694	28.570	
1876.....	37.80	74.5	5.0	12	1	0.36	0.25	3	1	38.16	59.0	2	29.135	29.667	28.570	
1877.....	39.65	60.0	21.0	1	0	0.80	2.00	3	0	47.13	71.2	2	29.301	29.621	28.826	
1878.....	40.22	66.0	15.5	4	0	2.86	2.50	9	1	54.63	78.5	0	29.016	29.498	28.575	
1879.....	34.06	74.0	5.0	9	0	0.41	4.50	2	0	39.04	64.7	0	29.199	29.621	28.609	
1880.....	37.58	64.0	8.0	11	0	0.73	0.00	7	1	24.94	64.5	0	29.125	29.733	28.473	
1881.....	25.78	61.5	5.5	18	0	4.60	22.00	7	0	54.17	79.8	3	29.180	29.571	28.660	
1882.....	41.65	73.0	12.0	4	3	1.66	2.00	6	0	45.49	69.7	0	29.110	29.441	28.531	
1883.....	27.92	67.0	13.0	13	3	2.31	4.00	9	1	51.67	77.9	1	29.340	29.869	28.492	
1884.....	25.03	57.0	1.0	10	1	1.13	2.00	8	1	54.33	72.3	1	29.158	29.469	28.587	
Mean.....	32.91	65.3	0.3	12	1	1.31	4.34	6	1	46.55	71.8	2	29.140	29.625	28.525	

In the column of minimum temperatures a dash indicates temperature below zero. In the column of winter days is given the number of days whose mean temperature was below 32°.

THE WEATHER OF THE PAST SEVENTEEN WINTERS.

From observations taken at Lawrence, Kansas, by Professor F. H. Snow.

The following table gives the chief characteristics of the past seventeen winters. During this period five winters have had a lower mean temperature and a larger number of zero days than the winter just closed; six winters have had a larger number of winter days, but only one has had a lower minimum temperature. The rainfall (including melted snow) has been three-fourths the average amount; the fall of snow has been slightly above the average depth; the cloudiness has been more than two per cent. above the mean; the wind has exceeded its average by more than 5,000 miles; there has been a single thunder-shower (the average number); there has been one more fog than usual, and the barometer has exceeded its average height.

Winter of—	Mean temperatures.				Min temp.	Max temp.	Winter days.	Zero days.	Snow, inches.	Rain, inches.	Thunder s'm	Mean cloudiness.	Miles of wind.	No. of fogs.
	Dec.	Jan.	Feb.	Season.										
1867-68.....	34.50	23.67	35.71	31.29	-7.0	72.0	48	3	6.50	.....	1	.....	.....	1
1868-69.....	24.29	30.50	30.63	28.49	-16.5	65.0	58	5	25.25	6.47	1	48.11	.....	6
1869-70.....	29.92	29.43	35.42	31.59	-4.0	69.0	36	2	8.50	1.57	0	49.83	.....	2
1870-71.....	28.70	28.86	35.30	30.95	-10.0	71.5	42	8	21.50	4.26	2	54.55	.....	6
1871-72.....	24.91	24.35	30.44	26.57	-12.0	61.0	53	11	14.50	2.11	0	47.63	.....	5
1872-73.....	19.93	18.01	30.26	22.93	-26.0	62.0	61	17	30.00	4.76	1	45.78	35.293	4
1873-74.....	31.37	28.01	27.05	28.90	-2.5	67.5	49	1	21.00	7.69	3	58.70	34.652	6
1874-75.....	31.01	15.00	21.92	32.84	-16.5	55.0	72	14	11.50	2.09	1	50.77	34.364	2
1875-76.....	39.35	34.70	37.80	37.28	-5.0	74.5	34	2	0.25	4.48	3	43.16	43.057	2
1876-77.....	23.00	25.60	39.65	29.62	-9.0	66.0	50	6	14.00	2.40	0	44.60	27.959	3
1877-78.....	44.43	33.97	40.22	39.54	-7.5	68.0	15	0	3.00	8.12	4	53.19	28.042	0
1878-79.....	23.05	23.49	34.06	26.87	-16.0	74.0	54	13	25.25	2.76	0	45.59	27.509	2
1879-80.....	26.23	41.23	37.58	35.01	-9.0	67.0	36	2	3.00	4.92	2	41.75	37.543	11
1880-81.....	25.84	21.60	25.78	24.41	-12.0	61.5	64	6	24.00	5.37	0	55.62	35.995	8
1881-82.....	40.10	32.68	41.65	38.14	-5.0	73.0	17	3	5.00	3.20	0	50.82	36.250	5
1882-83.....	31.25	19.65	27.92	26.27	-14.0	67.0	57	3	14.50	3.28	1	55.61	34.366	8
1883-84.....	33.72	20.99	28.03	27.58	-21.5	63.0	50	9	16.00	3.18	1	47.33	39.790	6
Mean.....	30.13	25.64	32.91	29.90	-10.8	66.9	47	7	14.34	4.23	1	49.57	34.568	5

84.
ate
The
for

nce.
ver-
past
are,
rys.
pes-
The
ed,
eb-

eter.

636
337
333
419
575
360
594
579
826
575
569
473
600
531
492
587

525

the
320.

en
ra-
in-
er
en
ive
8;
as
age

1
6
7
5
5
2
2
3
0
2
11
8
2
6
6
5

Chart I. Tracks of Low-Barometer Areas. February 1884.

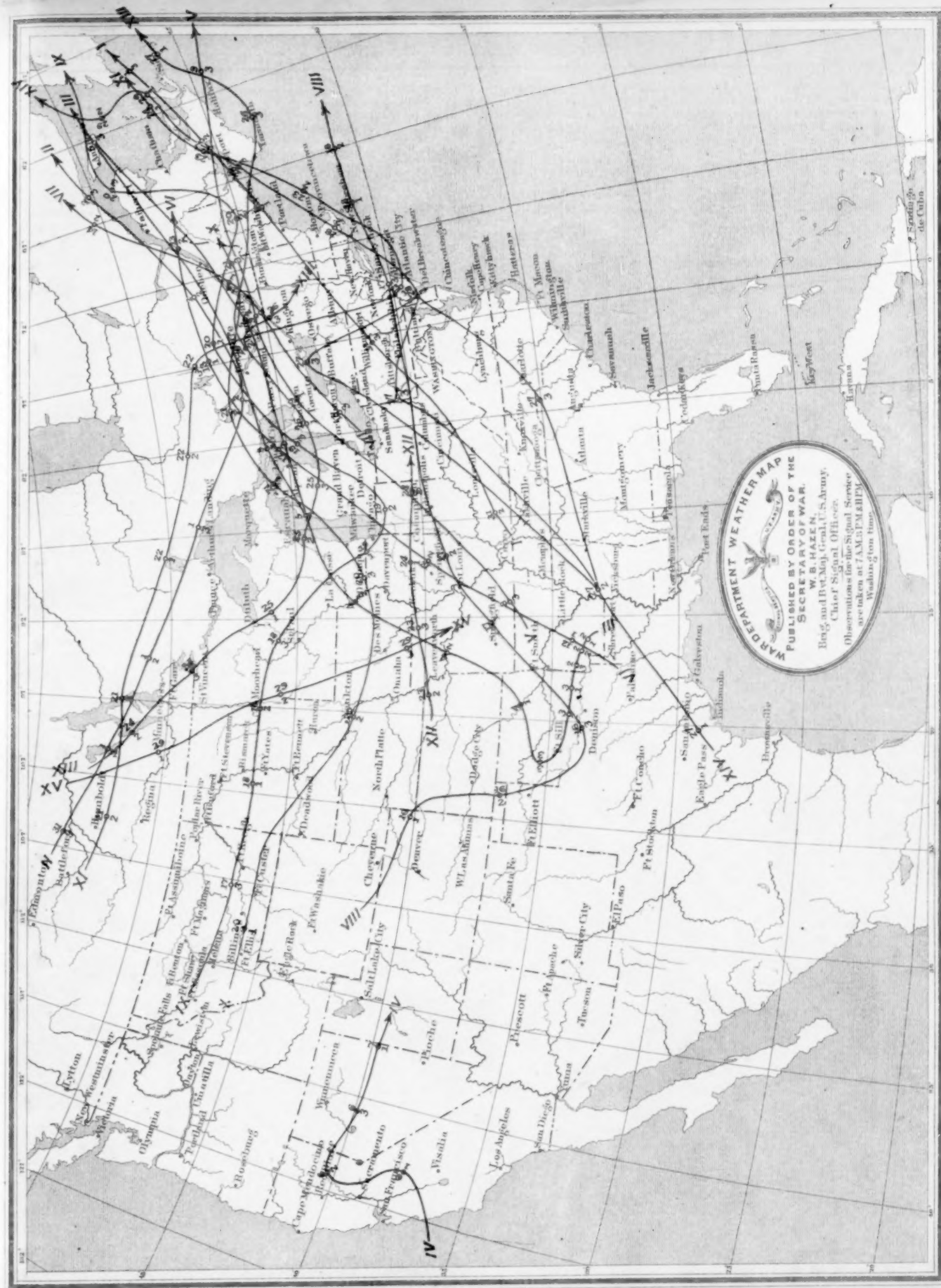


Chart II. Ocean Storm Tracks, February, 1884.

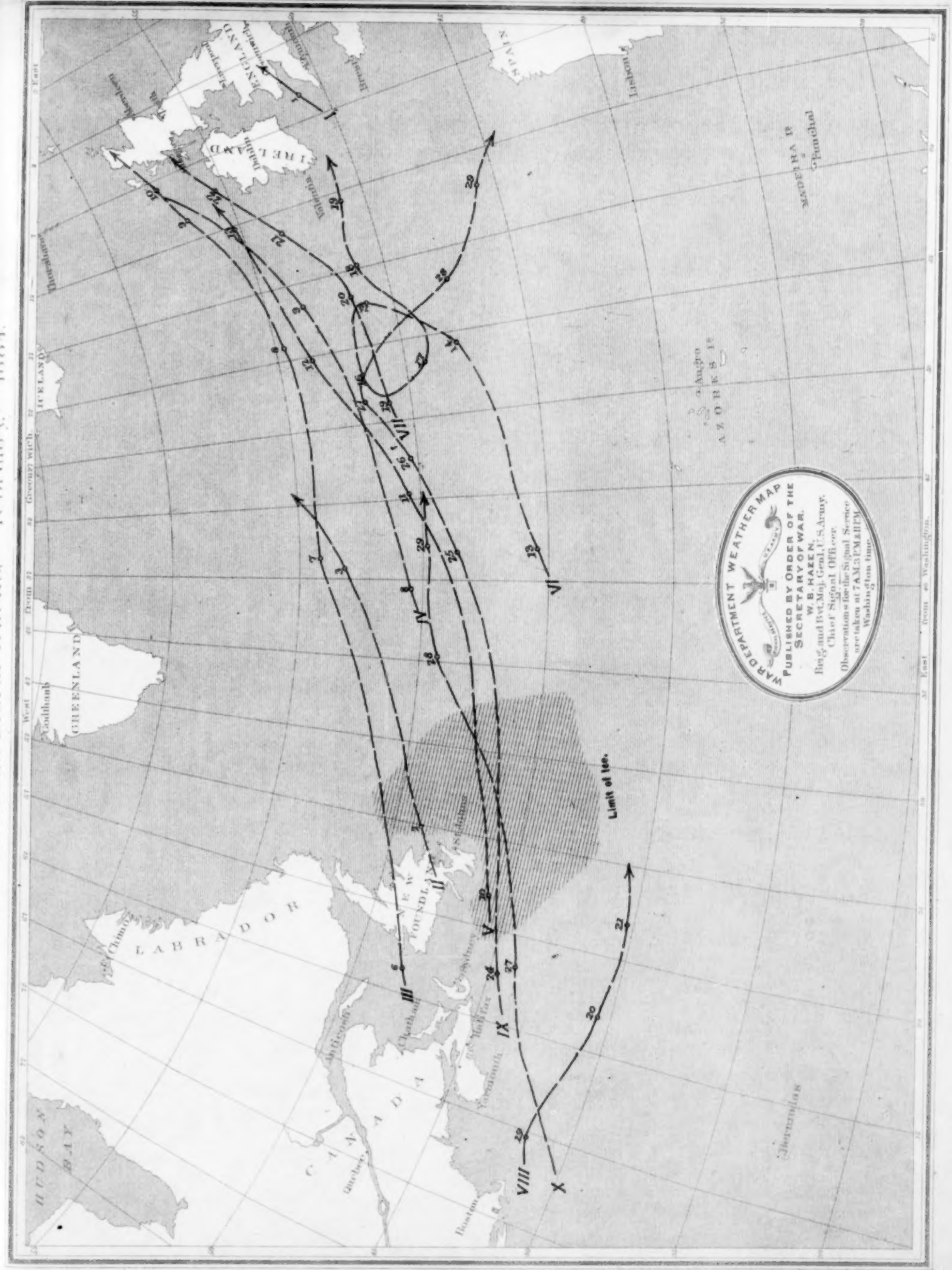


Chart III. Isotherms, Isotherms, and Winds. February 1884.

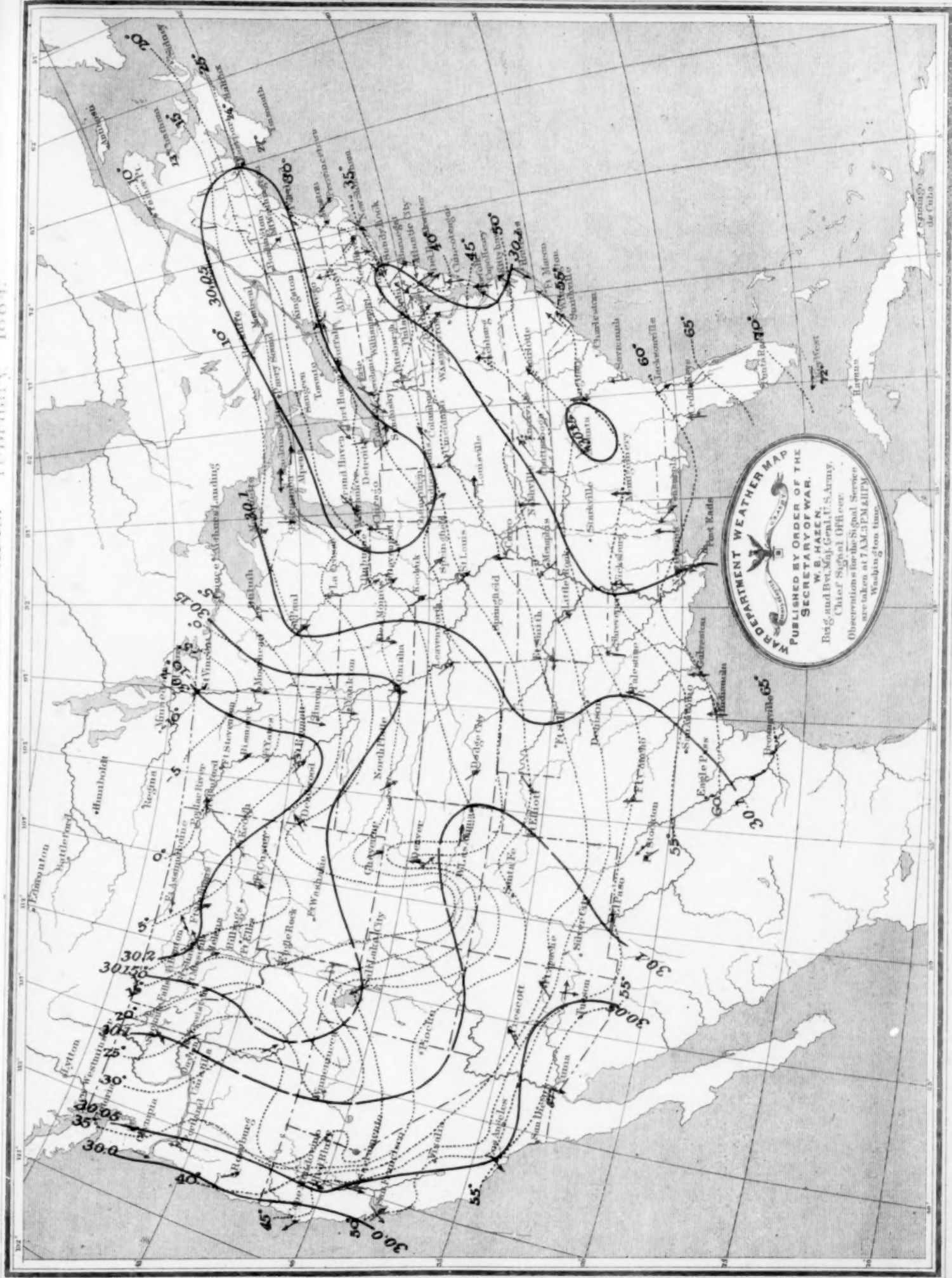


Chart IV. Precipitation, February, 1884.

